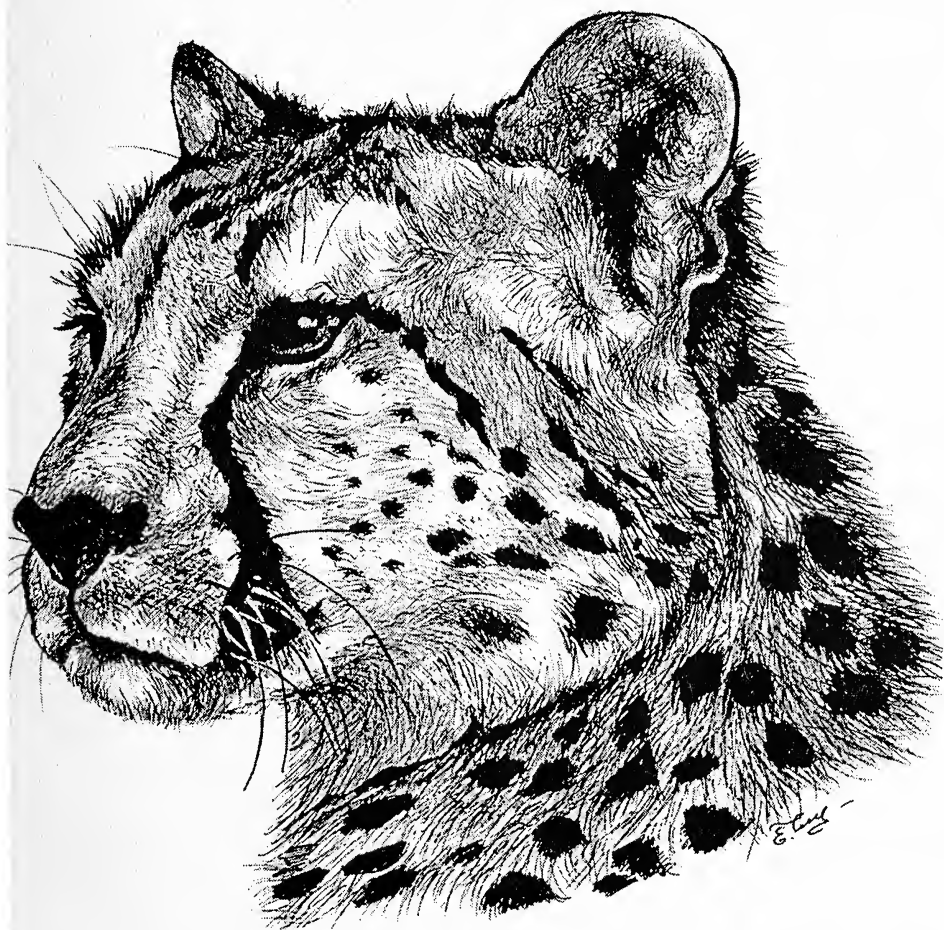


ANIMAL KEEPERS' FORUM



Special Dedicated Issue on Cheetah

**The Journal of the American
Association of Zoo Keepers, Inc.
JULY/AUGUST 2005**

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Animal Keepers' Forum is published monthly by the American Association of Zoo Keepers, Inc., 3601 S.W. 29th Street, Suite 133, Topeka, KS 66614-2054. Ten dollars of each membership fee goes toward the annual publication costs of Animal Keepers' Forum. Postage paid at Topeka, KS.

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From the Editor

Dear Readers,

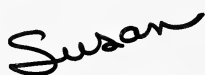
It is with great pleasure that we bring you this special double issue of *Animal Keepers' Forum* dedicated to the Cheetah (*Acinonyx jubatus*). As you will note, this edition combines the regular July and August 2005 issues of *AKF* into one. Therefore, the next regular issue of *AKF* will be the September 2005 edition. You will also note that this special issue does not contain any of the regularly seen columns and features of a standard *Forum* - Scoops, Coming Events, Enrichment Options, Reactions, Opportunity Knocks, etc. These regular features of the journal will return in the September issue. In the meantime, you may check the AAZK website (www.aazk.org) for an updated listing of coming events, conference information and job listings.

An issue such as this would not be possible without the interest, support and contributions made by the authors included here. The articles run the gamut from hand-rearing milk formulas to cheetah conservation efforts in the wild to captive breeding strategies and husbandry in zoos around the world. This issue contains an enormous amount of information on cheetahs that I hope you will find interesting, educational, and hopefully, useful in expanding your base of knowledge about this endangered species. I want to thank all of the authors for their willingness to share their experiences and expertise. I would like to especially thank *AKF* Associate Editor Kayla Grams for her efforts in contacting potential authors, offering suggestions and ideas along the way as the issue came together, and for always believing that this particular issue *could* happen. My thanks also to *AKF* Associate Editor Mark de Denus for his assistance in gathering and verifying information for the article on cheetah websites. In the world of the Internet change is constant, but at the time of publication, all of these sites were active and reachable via the Web. Thanks also to AAZK Administrative Secretary Barbara Manspeaker for proofreading for this issue.

Special thanks need to go to two outstanding artists who have shared their bountiful talents with us for this issue. Elena Chelysheva, former Lead Cheetah Keeper at the Moscow Zoo, has provided our spectacular cover art. Elena continues to be involved in cheetah research and conservation - you can read more about her in the *About the Cover* section below. As an editor, I seriously tried to figure out a way to have two covers for this particular issue since I also received a beautiful and creative piece of cheetah artwork from Yoshi. Yonetani from the Zoo Design & Education Lab (ZOO-Del) in Kobe, Japan. Because I wanted to include Yoshi's artwork in this special edition, it appears opposite as the lead-in page for this issue. Thanks both to Elena and Yoshi for sharing their artistic talents with us.

Following publication, a limited number of extra copies of this special issue will be available for sale. Price per copy will be \$10.00 US which includes domestic postage. Additional postage will be required internationally and will vary depending on the country. Please contact me at akfeditor@zk.kscoxmail.com if you are interested.

I hope you enjoy this dedicated issue of *Animal Keepers' Forum*.



Susan D. Chan
AKF Editor

About the Cover

This month's cover features the Cheetah (*Acinonyx jubatus*) drawn by Elena Chelysheva of Russia. Elena was Lead Cheetah Keeper at the Moscow Zoo, eventually becoming Curator of the Mammal Department for the Conservation Centre of Endangered Species. She worked in Namibia at CCF and as an assistant researcher at the Masai-Mara Cheetah Conservation project in Kenya. Elena is currently working towards her PhD. Cheetahs have unique calls, one of which is a chirping or a yipping high-pitched call they use in order to locate one another. Mothers will use this call to locate their lost cubs. Cheetah cubs are born with distinctive fur that covers their neck, called a mantle. There are many theories to its function, one of which is that it serves as camouflage in grassy habitats. Thanks Elena!



Artwork by Yoshi. Yonetani of the Zoo Design & Education Lab (ZOO-Del) in Kobe, Japan

Overview of the Global Wild Cheetah Population

By

Laurie Marker, PhD

Founder/Executive Director

Cheetah Conservation Fund, P.O. Box 1755

Otjiwarongo, Namibia

The status of the cheetah (*Acinonyx jubatus*), varies widely throughout its range with perhaps 32 countries where cheetahs are still found (Marker, 1998). All populations are classified as vulnerable or endangered by the World Conservation Union's (IUCN) Red Data Book and are regulated by the Convention for International Trade in Endangered Species of Wild Fauna and Flora (CITES) as Appendix I (CITES 1992). Although there has not been a comprehensive survey of African cheetahs since 1975, there is a consensus that the cheetah population is declining throughout Africa (Nowell & Jackson, 1996; Breitenmoser & Breitenmoser-Würsten, 2001). Total number of cheetahs estimated at less than 15,000 is based on a literature review and mail questionnaire surveys (Kraus & Marker-Kraus, 1991; Marker-Kraus and Kraus, 1996; Marker, 1998) and have been used as the source for data that is also published in the IUCN Cat Specialist group *Wild Cats* (Nowell & Jackson, 1996).

The wild cheetah is nearly extinct in Asia, with approximately 100 surviving in small-pocketed areas through Iran (Nowell & Jackson, 1996; Marker, 1998; UNDP, 2001). Free-ranging cheetahs inhabit a broad section of Africa including areas of North Africa, Sahel, eastern, and southern Africa (Kraus & Marker-Kraus; 1991; Nowell & Jackson 1996; Marker, 1998). Two strongholds remain for the cheetah, Kenya and Tanzania in East Africa and Namibia and Botswana in southern Africa (Kraus & Marker-Kraus, 1991; Nowell & Jackson, 1996; Marker, 1998). In East Africa, the cheetah has been found in the agriculture land in the Masai Mara region outside the national parks and were co-existing with the Narok Masai, whose stock they left alone (Burney, 1980; Hamilton, 1986). Recent surveys being conducted by Mary Wykstra and Sarah Durrant in both Kenya and Tanzania have indicated different challenges confronting cheetahs from these communities as a result of livestock predation by cheetahs. In southern Africa, cheetahs are killed regularly in farming areas due to livestock predation and the attitudes of the farmers (Morsbach, 1987; Wilson, 1987; Stuart & Wilson, 1988; Lawson, 1991; Marker-Kraus et al., 1993; Marker-Kraus et al., 1996; Marker & Schumann, 1998; Marker et al. 2003). Much of the conflict found in southern Africa is as a result of the increase of fenced game farms and cheetahs catching wild game that has value (Marker 2003, Marker et al 2003). Over the past few years there is an indication that cheetah populations have increased in Zimbabwe and South Africa as well as conflict with livestock and game farmers (A, Van Dyke, 1999; pers comm, N. Purchase, 2000 pers. comm.). Several programs are now working actively towards censusing cheetah populations in southern Africa, Kenya and Tanzania (Bashir et al. 2004). Conservation and education programs are also being actively conducted in many of these countries as well (Bartels et al. 2002).

There has been limited information from North or West Africa and the cheetah's future in these areas is questionable (Marker, 1998; Breitenmoser & Breitenmoser-Würsten, 2001). As part of an IUCN Biodiversity Project, status surveys have been carried out in Algeria, Egypt, Libya, Morocco and Tunisia (Jackson, 2001). Cheetah populations were reported to be in southern Algeria (O'Mopsan, 1998; Jackson, 2001); and in Egypt, cheetahs were reported near the Libyan border, but surveys found no evidence in other parts of former range (Saleh, 1997; Jackson, 2001). Cheetahs have been reported in the tri-country W park in Niger, Burkino Faso, and Benin (Van Syckle, 1996).

In February 2005, a reconnaissance trip into the D'Hoggars National Park in Algeria was undertaken along with members of the Sahelo-Saharan Interest Group to identify the presence of cheetahs in the area and to identify their survival risks (pers com). Park officials showed recent photos of cheetah. Photos were also presented by a tour operator of a dead cheetah that had killed livestock. During the reconnaissance trip, cheetah scat and cheetah marking trees were found and recorded (pers com).

Cheetahs continue to survive in small, pocketed groups in isolated areas throughout the Sahel, with

a low estimate of 9,000 animals and an optimistic estimate of 12,000 animals (Marker-Kraus et al. 1996; Nowell & Jackson, 1996; Marker, 1998). Perhaps for the cheetah though, individual numbers of animals may not be the important point, but the numbers of viable populations still existing. Viable populations may be found in only half or less of the countries where cheetahs still exist (Marker, 1998).

Over the past 30 years, the cheetah has suffered a devastating decline of available habitat and prey throughout its range, both of which are necessary for its survival. As reported throughout Africa, cheetahs are not doing well in protected wildlife reserves due to increased competition from other, larger predators such as lion and hyenas (Laurenson, 1991; Morsbach, 1987; Mills pers comm. 1991, 2001; Caro, 1994; Marker-Kraus et al., 1996; Nowell & Jackson, 1996). Therefore, a large percentage of the remaining, free-ranging cheetah populations are outside of protected reserves or conservation areas (Marker, 1998). The cheetah generally has been considered to inhabit open country and grasslands. More recently, cheetahs have been reported to use a wide variety of habitats and are often reported in dense vegetation eg. Kora Reserve in Kenya, Botswana's Okavango Delta, Serengeti woodlands, and Namibian farmlands (Caro, 1994; Marker-Kraus et al., 1996; Marker 2003).

The ability of the cheetah to adapt to a changing ecological system has been brought about primarily by conversion of its preferred habitat to farmland and is perhaps the critical question in estimating the population's survivability in Africa (Myers, 1975). In several studies during the past 25 years, the cheetah was reported to suffer a decrease in numbers as land was developed and suitable habitat converted to agriculture (Wrogemann, 1975; Hamilton, 1986; Myers, 1975; Cambell & Borner, 1988; Wilson, 1988; Morsbach, 1987; Marker-Kraus & Kraus, 1990; Marker-Kraus et al., 1996; Nowell & Jackson, 1996).

Controlling factors determining cheetah survival include small populations, restricted habitats with a limited prey base, conflict with nomadic herders, and wars that have supplied guns and ammunition to the populace, who may then poach all forms of wildlife for food and profit; poaching for pelts, and conflict with commercial livestock farmers and game farmers (Marker, 1998; Jackson, 2001).

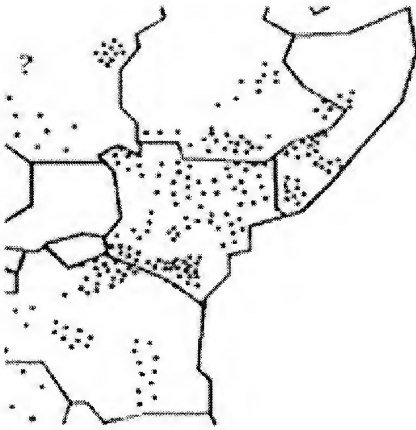
Priorities from the Cat Specialist Group meeting in August 2001 (Breitenmoser & Breitenmoser-Würsten, 2001) include encouraging support for:

- a survey in North Africa, populations critically endangered due to fragmented populations
- a survey in Iran and the development of a conservation action plan
- the development of regional programs (S Africa, C Africa, N Africa)
- a pan-African survey to refine population estimates and threats
- conservation outside protected areas
- conservation efforts to reduce livestock conflict
- a census program in countries where cheetah trophy hunting is conducted
- an increased need to develop prey base management throughout the cheetahs range
- a tourism education program in parks to reduce stress (e.g. Kenya)
- the increased cooperation between international captive population management
- a global master plan

Distribution: Algeria; Angola; Benin; Botswana; Burkina Faso; Cameroon (ex?); Central African Republic; Chad; Democratic Republic of Congo, Egypt (ex?); Ethiopia; Gambia (ex?); Iran; Kenya; Libya (ex?); Malawi; Mali; Mauritania; Morocco (ex?); Mozambique; Namibia; Niger; Nigeria (?); Pakistan (ex?); Senegal (ex?); Somalia; South Africa; Sudan; Swaziland; Tanzania; Togo; Uganda; Western Sahara (ex?); Zaire (ex?); Zambia; Zimbabwe (Nowell & Jackson, 1996; Marker, 1998; Breitenmoser & Breitenmoser-Würsten) (ex ? = possibly extinct).

East Africa

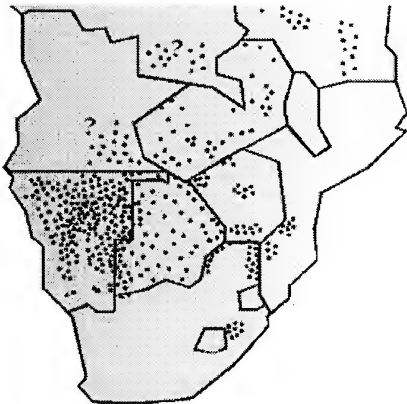
A. j. raineyii



- Kenya (~1000)
- Tanzania (~1000)
- Uganda (<50?)
- Somallia (<300?)

Southern Africa

A. j. jubatus

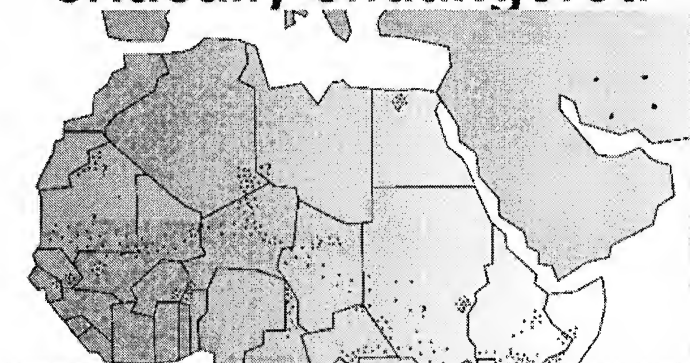


- Namibia (~3000)
- Botswana (~1500)
- South Africa (~1000)
- Zimbabwe (~1000)
- Zambia (~50)
- Mozambique (?)
- Malawi (?)
- Angola (?)

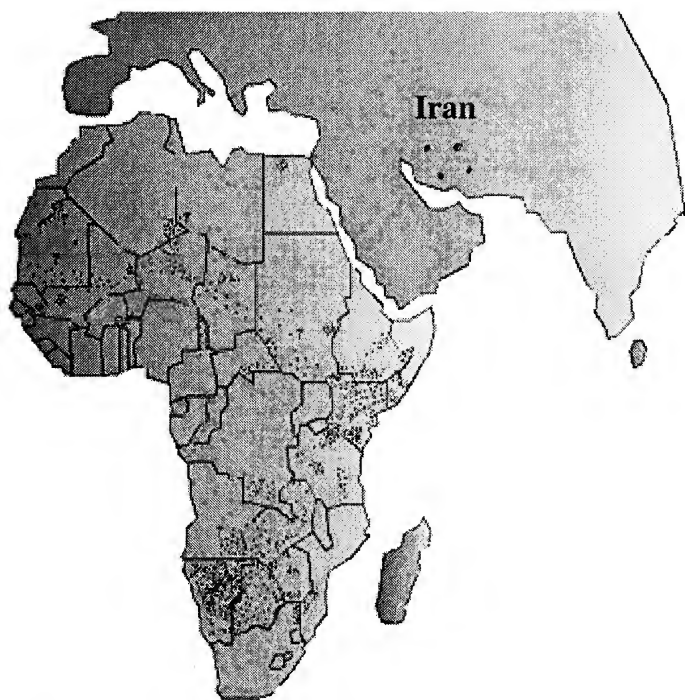
(Editor's Note: View and download the 2001 Global Cheetah Action Plan at:

www.cbsg.org/reports/reports/exec_sum/GlobalCheetah_LowRes.pdf)

Cheetah populations that are critically endangered



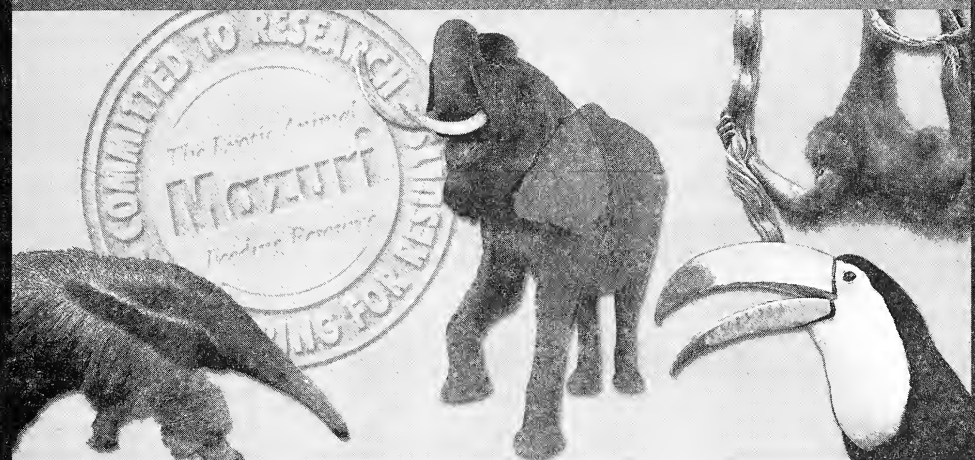
- North Africa and Asia: *A. j. venaticus* (<500)
- West Africa: *A. j. hecki* (~500)
- Central Africa: *A. j. soemmeringii* (500-1000)



African Continent Cheetah Distribution Map

References Cited:

- Bartels, P., H. Berry, D. Cilliers, A. Dickman, S. Durant, J. Grisham, L. Marker, M. Mulama, B. Schumann, U. Tubbesing, L. Venter, D. Wildt, S. Ellis, and Y. Friedmann. 2002. Global cheetah conservation action plan: 2002. Final report. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN.
- Bashir, S., Daly, B., Durant, S.H., Forster, H., Grisham, J., Marker, L., Wilson, K., Friedman, Y. 2004. Global Cheetah (*Acinonyx jubatus*) Monitoring Workshop. Final Workshop Report Conservation Breeding Specialist Group (SSC/IUCN) Endangered Wildlife Trust.
- Breitenmoser, U. & Breitenmoser, Würsten, C. 2001. Cat Specialist Core Group Report. Sparenmoos, Switzerland.
- Burney, D.A. 1980. The effects of human activities on cheetah (*Acinonyx jubatus*, Schreber) in the Mara region of Kenya. Msc. Thesis, Univ of Nairobi, Nairobi. pp.219.
- Campbell, K. & Borner, M. Cited in *Cat News*. P. Jackson, (Ed.) IUCN Publ, Gland, Switzerland. Vol.8, 1988, pp.9
- Caro, T. 1994. *Cheetahs of the Serengeti Plains, Group Living of an Asocial Species*. Univ. of Chicago Press, Chicago, IL.
- CITES, 1992. Quotas for trade in specimens of cheetah. Eighth meeting of the convention of International Trade in Endangered Species of Wild Fauna and Flora. DOCUMENT 8.22 (rev.):1-5.
- Frame, G.W. 1992. (pers comm.) C/O African Wildlife Husbandry Development Association, 01 B.P.5570, Ouagadougou 01, Burkina Faso.
- Gros, Paula, 1989, 1990, 1991. (pers comm.). Wildlife and Fisheries Department, University of California at Davis, Davis, California 95616, USA.
- Hamilton, P.H. 1986. Status of the cheetah in Kenya, with reference to sub-Saharan Africa. In: *Cats of the World: Biology, Conservation, and Management*. S.D. Miller; D.D. Everett, (Eds.) Washington, DC, National Wildlife Federation.
- Jackson, P. 2001. Report to the Cat Specialist Core Group, Sparenmoos, Switzerland.
- Kraus, D. & Marker-Kraus, L. 1991. Status of cheetah. Report to the IUCN Cat Specialist Group, Gland, Switzerland.
- Lawson, Dave. 1991. (pers comm.). Department of Wildlife and National Parks, Gaboronne, Botswana.
- Laurenson, K. 1991. Cheetahs never win. *BBC Wildlife Magazine*, Feb. pp 99-105.
- Marker, L. 1998. Current Status of the Cheetah (*Acinonyx jubatus*). In: *Proceedings of a Symposium on Cheetahs Game Ranch Animals*. (Ed) B.L. Penzhorn, Onderstepoort, South Africa. pp.1-17.
- Marker, L. (2003) Aspects of cheetah (*Acinonyx jubatus*) biology, ecology and conservation strategies on Namibian farmlands, pp. 476 *Department of Zoology*, University of Oxford, Oxford, U.K.
- Marker, L.L., Dickman, A.J., Mills, M.G.L. & Macdonald, D.W. (2003) Aspects of the management of cheetahs, *Acinonyx jubatus jubatus*, trapped on Namibian farmlands. *Biological Conservation*, 114, 401-412.
- Marker, L., & Schumann, B.D. 1998. Cheetahs as problem animals: management of cheetahs on private land in Namibia. In: *Proceedings of a Symposium on Cheetahs as Game Ranch Animals*. (Ed) B.L. Penzhorn, Onderstepoort, South Africa. pp.90-99.
- Marker-Kraus, L. & Kraus, D. 1990. Investigative trip to Zimbabwe and Namibia. *Cat News*. P.Jackson, (Ed.) IUCN Publ, Gland, Switzerland. Vol.12, (1) pp 16-17.
- Marker-Kraus, L., Kraus, D., Carpenter, M. 1993. The cheetah in Botswana: An overview. In: *1992International Cheetah Studbook*, L.Marker-Kraus, (Ed). NOAHS Center, National Zoo, Washington, D.C.
- Marker-Kraus, L., Kraus, D., Barnett, D., Hurlbut, S. 1996. *Survival of cheetah on Namibian Farmlands*, Cheetah Conservation Fund Publication, Windhoek.
- Marker-Kraus, L. & Kraus, D. 1996. Update report on the status of cheetah prepared for the Cheetah and Lion PHVA briefing book. *1996 International Cheetah Studbook*, NOAHS Center, Smithsonian.
- Mills, Gus. 1991, 2001. (pers comm.). Kruger National Park, P.O. Box 125, Skukuza 1350, South Africa.
- Morsbach, D. 1987. *Cat News*. P. Jackson, (Ed.) IUCN Publ, Gland, Switzerland. Vol.6, 1987, pp. 25-26
- Myers, N. 1975. The cheetah, *Acinonyx jubatus*, in Africa. *IUCN Monograph 4*. Morges, Switzerland, International Union for Nature and Natural Resources.
- Nowell, K. & Jackson, P. 1996. *Wild Cats*, Burlington Press, Cambridge.
- O'Mopsan, L.K. 1998. The Cheetah in Algeria. In: *1996 International Studbook*, L. Marker, (Ed.), NOAHS Center, National Zoo. Washington DC.
- Purchase, N. 2000. Pers comm....Aberdeene University., dnp@icon.co.zw
- Salch, M.1997. Conservation of the Cheetah. *Egypt's National Report*, an IUCN Report. Egyptian IUCN National Commission, Project No. 7519E/DDA/ASR/Africa Program.
- Stuart, C. & Wilson, V., 1988. *The Cats of Southern Africa*, IUCN Cat Specialist Group, African Carnivore Survey, Chipangali Wildlife Trust, Bulawayo.
- UNDP. 2001. GEF Grant, Project no. IRA/00/G35, entitled: Conservation of the Asiatic Cheetah, Its Natural Habitat and Associated Biota in the I.R. of Iran.
- Van Dyke, A., 1999. Pers. Comm. DeWildt Cheetah Breeding Centre, South Africa. Cheetah@DeWildt.org.za
- Van Syckle, S. 1996. The cheetah in W National Park, Niger, West Africa. In: *1994/1995 International Cheetah Studbook*, L. Marker-Kraus (Ed). NOAHS Center, National Zoo, Washington, DC.
- Wilson, V.J. *Cat News*. P. Jackson, (Ed.) IUCN Publ, Gland, Switzerland. Vol.8, 1988, pp. 9.
- Wrogemann, N. 1975. *Cheetah Under the Sun*. McGraw & Hill, Johannesburg.



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Herpesvirus Infection in Cheetahs

By Graham Crawshaw, Senior Veterinarian
Toronto Zoo, 361 Old Finch Avenue
Scarborough, Ontario M1B 5K7, Canada

Feline herpesvirus 1 (FHV1) is a very common cause of upper respiratory disease in domestic cats, causing sneezing and discharges from the eyes and nose. In most cases, cats recover spontaneously and completely, although some will develop persistent infection. The virus may also affect the eyes causing opacity and ulceration of the cornea and conjunctiva. More rarely lesions may be seen on the skin. Wild felines are also susceptible to infection and in these the disease may be severe and even fatal. Upper respiratory infection consistent with FHV-1 has been seen in cheetahs in North America but several collections have also experienced a persistent form of the disease affecting the eyes, eyelids and skin. The following has been based on the experience of the author and has, in large part, been extracted from the paper by Munson et al (2004).

In many of the affected cheetahs skin lesions were preceded by signs of upper respiratory tract infection either in the animals themselves or in the dams of affected cubs. The skin manifestation of FHV1 infection is unusual, but at least 20 cheetahs in nine zoos have now been confirmed with this condition, and additional animals with similar lesions have been reported. In most cases, the cutaneous lesions first occur as swellings at the inner corner of the eye and on the eyelids that may progress to non-healing ulcers. Lesions may extend across the nose, and have also been seen on the lips, top of the head, distal forelegs, flank, tail, and footpads. Some cheetahs also had corneal ulcers, and one animal had an ulcer on the tongue.

The skin lesions are typically firm plaques with a raised rim and central ulceration. White pus is present in many cases. Over time, these plaques may expand and the skin become thickened. Many affected animals were juveniles or cubs as young as two weeks, but seven animals were subadults or adults ranging from one to six years of age. Infection was probably acquired from the persistently infected dams at, or shortly after, birth. The severity and unremitting nature of the dermatitis resulted in euthanasia of six cheetahs including one chronically affected animal that developed a carcinoma at the site of infection.

The herpesviral-associated dermatitis in cheetahs resembles the ulcerative dermatitis that rarely occurs in FHV1-infected domestic cats. It is not known why this form of the disease appears to be so much more common in cheetahs than in other cat species, but suggests an aberrant immune response to the virus in this species. It has been proposed that cheetahs may be immune-compromised because some of their genes lack heterogeneity. Stress has been linked to persistent FHV1 diseases in other species, including domestic cats. Although stress levels were not measured in the affected animals, captive cheetahs generally show internal changes indicative of chronic stress, and develop other diseases that may be stress-related.

Feline herpesvirus is one of the components in standard cat vaccines although the response and effectiveness of these vaccines is variable even in domestic cats. Vaccination did not prevent the disease or prevent infection being passed onto cheetah cubs. Advanced lesions were only minimally responsive to topical or systemic antiviral drugs. The most effective therapy was complete surgical excision with or without cryosurgery. The current recommendations to treat and prevent the disease are to remove lesions with surgery, quarantine infected animals, and prevent maternal transmission by hand-rearing cubs from infected dams. As a result, some collections prefer to separate cubs from dams at birth and hand-rear them in an attempt to develop herpesvirus-free groups of cheetahs.

Reference

- L. Munson, R. Wack, M. Duncan, R. J. Montali, D. Boon, I. Stalis, G. J. Crawshaw, K. N. Cameron, J. Mortenson, S. Citino, J. Zuba and R. E. Junge. 2004. Chronic eosinophilic dermatitis associated with persistent feline herpes virus infection in cheetahs (*Acinonyx jubatus*). *Veterinary Pathology* 41: 170

The Introduction of Three Abandoned Cheetah Cubs to a Foster Mother and Half Siblings at the Fort Worth Zoo

By

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Overview

In 1994 the Fort Worth Zoo opened a new cheetah facility. By 1995 the population was 2.4 cats. One of the males, Baya Mdomo, was an older animal that had never bred. "Mdomo" was 13 years old when he arrived at the Fort Worth Zoo. He had been imported from the De Wildt cheetah breeding facility in 1987 by the Cincinnati Zoo and Botanical Garden. In July 1992 he was transferred to the Louisville Zoo. He never produced offspring and from keepers daily reports he never appeared to be sexually active, or even interested in breeding. It was hoped that he would breed in Fort Worth since his genetics were desirable to the gene pool.

Baya Mdomo was introduced to the females in 1995, and eventually kept with them in the spacious new exhibit yard. The three females were Cara, a nine-year-old; Naomi, a three-year-old; and Taylor, a two-year-old. None of these females had produced litters at this time. Cats were brought to separate runs at the cheetah building to be fed so as to avoid fighting and to make visual observations of each one. Breeding activity was noted in the summer of 1995. In mid-September 1995, keepers noted that Naomi's abdominal area did not appear to be the normal shape. This cat gave birth on 19 October to five cubs which would have coincided with the suspected breeding activity noted in the summer. The first cub did not survive, and it was initially decided to pull the second for hand-rearing. Vet staff took #2 to the hospital, and meanwhile numbers three and four were born. The #2 cub was brought back since it appeared that the mother was showing appropriate maternal instincts. A fifth cub was delivered sometime later. The total span of time for parturition is estimated at about two and a half hours. Cubs were checked first thing the next morning. They were found in a pile and it appeared that they had full bellies. The cheetah area was then made off-limits to vehicular and foot traffic which would normally run to and from the Education Building. This was done to reduce the noise and activity level around the barn as had been recommended by staff at Fossil Rim Wildlife Center. Burlap and other shade screens were hung on all fence lines to reduce visual contact by all of the cats. Only keeper staff was to go into the area and only to check, feed, and water the cats.

The Education Building located alongside the back of the cheetah facility suddenly became a 24-hour monitoring center with the installation of a closed-circuit monitor. For the first two days observers, which included zoo docents, could only monitor Naomi as she paced in and out of the den. By the third day a video monitoring system was set up, and a camera carefully camouflaged, allowing a view into the den. Although the mother was seen pacing a lot, it could also be seen that she was caring for the cubs as well. It did appear that her mothering instincts were good enough that she could give her cub's adequate care, but she did not seem to be an overly attentive mother. She would carry the cubs out into the pen and leave them, or pace with one in her mouth. It was then decided to lock her in the den for most of the time, releasing her for about an hour a day to give her a break. When she was locked in the den with the cubs she would care for them adequately (they were seen nursing and crawling around, and the mother would be seen sleeping most of the time), but she could never be trusted to have access to the pen and den.

On Day 5 one of the cubs did not seem to be exhibiting the same activity level as the rest and it was taken to the hospital. When we intervened to retrieve the cub we were able to determine that the sex ratio of the litter was 2.2. The cub that went to the hospital, a male, did not survive, leaving 1.2. The cubs were then identified and given ISIS numbers. Naomi did not appear to be affected by the intrusion of us handling the cubs, and came back in to settle down and nurse the remaining cubs.

Cara, a nine-year-old female also suspected of being pregnant, was immobilized and radiographed. The x-ray revealed that she was pregnant with at least two cubs. A cubbing den was quickly set up for her as well, and a video camera was mounted in the den. Birth took place on 25 October at

1730hrs and 1830hrs, and was captured on video. Cara was normally nervous and standoffish, but underwent a personality change once she gave birth. She was actually very calm and quiet when we were in the area working nearby or with her and her cubs. The two cubs were both male, their entire coats were fluffy white fur, not the usual 'ratel' coat pattern like the others.

On Day 9 of litter #1's life, Naomi began exhibiting strange and distressing behavior. She took a cub in her mouth and paced very vigorously with it, often hitting it against the fence. The injured cub was taken to the hospital for treatment. Fortunately the cub survived and, after going home with vet staff, the cub was introduced back to the group. Naomi appeared to accept the cub back although her overall treatment of the cubs was not as we would have liked.

On Day 11 of litter #1, Naomi was given a dose of 5mg valium to see if this would alleviate her nervousness. Unfortunately it had the opposite affect. She was taking cubs into her mouth and putting them up on the sleeping platform, dropping them and stepping all over them. These cubs were not gaining weight, and it was apparent a day later that they were in fact losing weight. It was noted on video that she was not nursing them, and the decision was made to pull the cubs for hand-rearing.

In summary, Naomi, a first-time mother, initially seemed to have accepted the cubs. From Day 1 until Day 11 she appeared to be providing adequate care for the cubs to survive. The cubs were gaining weight and appeared healthy. However, by Day 12 it was evident that the cubs growth rate had slowed down. Reglan® was administered in hopes of improving Naomi's milk production and she was observed eating all of the food offered. But Naomi seemed to spend less time with the cubs, opting to stay away from them, up on the platform in the den.

When the cubs were pulled they were tube-fed and put on a feeding schedule. They began to gain weight and have good stool. Cara's cubs were gaining weight as well, and she was providing them with excellent care. On 9 November a decision was reached that we would attempt to see if Cara would foster Naomi's cubs. The factors influencing this decision was that the cubs would grow up without becoming imprinted on humans, and also to stimulate Cara's milk production which could have diminished with only two cubs nursing. The total length of time to complete the introduction was predicted to be three weeks.

Introductions:

Day 1 of intro: At 0900hrs Cara's larger cub was pulled, and put with the two females of litter #1, and replaced with Naomi's male cub. Before putting the new cub in the den, he was rubbed with a towel that had been covered with the scent of Cara's cub. Cara accepted the new cub immediately. She groomed him and settled down to even let him nurse. By 1600hrs that day Cara's cub was returned. She accepted three cubs, although we were very cautious and did not want to go too fast possibly causing her to abandon them altogether.

Day 2: Once again the larger of Cara's cub was taken out of the group and placed with a female cub from Naomi's litter. The other female cub was placed with Cara and the two males (one Cara's, one Naomi's). Again, the same procedure of rubbing the cub with scent from the den was applied. Initially Cara accepted this cub, but when we tried her with four she became restless and remained up on the bench, so the female cub was pulled, and replaced with her male cub.

Days 3-21: Cara was still providing excellent care to the three male cubs. The two females were being hand-reared by keepers and vet staff. The female cubs were eating a diet of soupy Nebraska Brand® Canine Diet. Cara's cubs were also beginning to eat solid food. On Day 19 the female cubs' diet was changed to include canned feline diet (Hills® Brand). Canned feline diet was also offered to Cara and the cubs. All cubs were active and playing and gaining weight.

Day 22: It was decided to try all the cubs with Cara as the female cubs were now eating solids. At first one of the females was put in with her half and full sib. Cara's other cub was moved and placed with the other female. The introduction of the first female cub went very well. Cara and this cub seemed to bond instantly. They were seen eating canine diet together, and Cara groomed her. After only a few hours the male from litter #1 was removed and replaced with the two that were initially

removed. One of the female cubs from Naomi's litter was initially frightened, but did accept Cara after watching her interacting with the other cubs. Both of Naomi's female cubs were observed nursing. The last cub remaining out was returned to Cara, and by the end of the day Cara had accepted all the cubs.

The Fort Worth Zoo's veterinarian, Dr. Nancy Lung, in an article for the Cheetah SSP newsletter, stated that the 'success of the second introduction would be measured by the behavioral development and weight gain of the five cubs'. One of the female cubs, the one that had been injured by Naomi, died several months later due to adhesions of scar tissue on internal organs as a result of her injuries and medical treatment. The remaining four cubs were eventually sent off to several other institutions, and the remaining female was eventually the only survivor out of the group, but she has since produced three litters, and is due (at the time of this writing) with a fourth litter. Thus, the founder, Baya Mdomo, whose genetic contribution had previously appeared doubtful, is represented in the North American SSP® population, due to the procedures outlined in this article.

The author wishes to acknowledge her former institution, The Fort Worth Zoo, for authorizing her to write this article 10 years after the fact; Jeanne Jacobsen of the Fort Worth Zoo and Mary Jo Stearns of Fossil Rim Wildlife Center for information provided as well.

References:

Lung, N & M. Fouraker (1996). Fort Worth Zoo Summary of Cheetah Introductions.
Cheetah News (Cheetah SSP® Newsletter) 6(No.1):7-8.

CURRENT STATS ON NORTH AMERICAN CAPTIVE CHEETAH POPULATION

As of May 2005 there are:

- 124.128.5 (257) cheetah in North America
- At 59 institutions.
- There have been 39 cubs born since May 2004

*Source: Laurie Bingaman Lackey
International Species Information System (ISIS)*

Hand-rearing Cheetah (*Acinonyx jubatus*) Cubs: Milk Formulas

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Artificial milk formulas manufactured for domestic kittens have traditionally been used as the hand-rearing milk formula for captive wild felids. This paper will compare the differences between the composition of cheetah (*Acinonyx jubatus*) maternal milk and that of the domestic cat. The differences are significant, especially regarding the carbohydrate (lactose) content. As a result, using a milk formula designed for domestic kittens does not closely match the composition of cheetah milk. However, modifications to kitten milk formulas may provide a more nutritionally balanced diet for cheetah cubs and contribute to increased growth rates and decreased incidence of digestive disorders.

The maternal milk composition of cheetahs is more concentrated in solids and fat and lower in protein and carbohydrates than the domestic cat (table 1). Kitten milk replacer (KMR®) has been used quite regularly at cheetah breeding facilities that hand-rear cubs. KMR®, in the liquid form, is most commonly used and many times is diluted with water or 5% dextrose for the first several feedings. Anecdotal reports indicate cubs have digestive problems (diarrhea or constipation) when the undiluted formula is used. Facilities have indicated the powder form of KMR®, which can be mixed with water at different dilutions, doesn't mix well and is more prone to cause digestive upset, presumably because the powder stays in a "lump" in the cub's stomach and can't be digested properly. Other facilities have chosen to use Esbilac®, which is a puppy milk replacer. Esbilac® is higher in fat and lower in carbohydrates than KMR®. Taurine, an essential amino acid for felids, is not in the Esbilac® formula, so must be added prior to feeding (250mg/cub/day) (McManamon and Hedberg, 1993). A recent survey on hand-rearing protocols of captive felids indicated there was equal preference for Esbilac® + taurine and KMR® + Multi-Milk® formulas (Hedberg, 2002).

Table 1: Comparison of the maternal milk composition of cheetah and domestic cat. Ben Shaul (1962)¹, Abrams (1950)².

	Cheetah ¹		Domestic cat ²	
	AF	DM	AF	DM
Solids %	23.7		17.7	
Protein %	9.4	39.7	7.2	40.5
Fat %	9.5	40.1	5.0	28.0
Carbohydrate %	3.5	14.8	4.9	27.8
Ash %	1.3	5.4	0.7	3.7
Kcal/ml*	1.4	5.8	0.9	5.3

* Kcals were calculated. AF = as fed basis. DM = dry matter basis

Cheetah milk is higher in dry matter content (total solids), fat and ash (mineral component) and lower in carbohydrates than domestic cat milk. In many of the species that are hand-raised, carbohydrate is the limiting nutrient. Many species are lactose-sensitive and lack the enzyme lactase

to break down milk sugars. Because of that, milk formulas manufactured for domestic species must usually be diluted significantly to provide a formula that doesn't exceed the carbohydrate level wild species are able to digest. Such is the case with KMR®. The liquid form (canned) provides 18.2% solids, 42.2% protein, 25.0% fat and 26.1% carbohydrates (DM basis). That formula is comparable to the domestic cat's milk, but is very different from the cheetah's. If the carbohydrate component is the limiting factor, the milk must be diluted enough to make the carbohydrate portion approximately 14-15% of the total solids (on DM basis) or 3.5% (on "as fed" basis). Diluting KMR® liquid to a 2:1 ratio of formula to water gives a carbohydrate content of 3.2%. A ratio of 3:1 provides 3.6% carbohydrates, both of which would be acceptable for cheetahs. However, diluting the formula to reduce the carbohydrates also decreases the amount of protein and fat in the diet. See table 2 for the proximate analysis of KMR® canned formula dilutions.

Table 2: Comparison of nutrient composition of KMR® canned formula dilutions. Values are on an "as fed" basis. Ben Shaul (1962)¹, Pet AgTM 2

	Cheetah req. ¹	KMR® canned ²	KMR® 3:1 dilution	KMR® 2:1 dilution
Solids %	23.7	18.2	13.7	12.1
Protein %	9.4	7.7	5.8	5.1
Fat %	9.5	4.6	3.5	3.0
Carb. %	3.5	4.8	3.6	3.2
Kcal/ml	1.4	0.9	0.69	0.6

From the above data, it is apparent that while reducing the level of carbohydrates to the cheetah requirement, it also decreases the amount of protein to 54-62% of cheetah milk and fat provides only one-third the requirement. Felids obtain energy from protein and fat (Bechert, et al., 2002). The main effect that results from a diluted formula is delayed growth rates and/or skin and haircoat problems. Hair loss was noted in snow leopards that consumed an Esbilac® formula deficient in protein. The problem was resolved after adding chicken baby food, which increased the protein level (Hedberg, 2002).

Another issue with diluting the milk formula concerns the amount of calories the cub receives in a 24-hour period. Growing cubs require a minimum amount of calories for basic body functions, development and growth. Many hand-rearing protocols suggest feeding a certain percentage of the body weight (e.g. 15-20%) on a daily basis. However, there can be vast differences in the caloric content of formulas, especially when diluted.

For example: say we have three 600g (20 oz.) cheetah cubs. One is maternally raised, the other two, hand-raised. Of the hand-raised cubs, one is fed formula #1, as described below. The other cub is fed formula #2. Based on the recommendation that formula be offered in the volume equivalent to 15-20% of the body weight, each cub would receive between 90-120 ml (3-4 oz.) of formula/day. Cheetah milk provides 1.37 kcal/ml. At 15-20% body wt., the cub would receive between 123-164 kcal/day. In this example, we'll use that caloric range as the target for the two hand-rearing formulas.

Cheetah milk

Provides 1.37 kcal/ml of formula
Fed at 15-20% body wt: receives 90-120 ml formula/day
90 ml x 1.37 kcal/ml = 123.3 kcal/day
120 ml x 1.37 kcal/ml = 164.4 kcal/day

Formula #1 (canned KMR®, diluted w/ water at ratio of 3:1)

Provides 0.69 kcal/ml of formula
Fed at 20% body wt: receives 120ml formula/day
120 ml x 0.69 kcal/ml = 82.8 kcal/day

Formula #2 (KMR® & Multi-Milk® powders mixed w/ water at ratio 1: 1: 2 1/2) -> in Table 3
Provides 1.26 kcal/ml of formula
Fed at 17-20% body wt: receives 102-120ml formula/day
102ml x 1.26 kcal/ml = 128.5 kcal/day
120 ml x 1.26 kcal/ml = 151.2 kcal/day

The caloric content of formula #1 provides 50-67% of the calories in cheetah milk, when offered at 20% body weight. The caloric content of formula #2 falls within the range of cheetah milk, when fed at 17-20% body wt., and provides 1.8 times more calories than formula #1, when the same amount (20% of the cub's body wt.) is offered. Formula #2 is more nutrient dense than formula #1. In order to provide equivalent calories, formula #1 would have to be fed at 30-40% body wt. to match formula #2 and cheetah milk. Diarrhea has been reported in exotic felids that consume $\geq 25\%$ body wt/day, so no more than 20% should be offered (Hedberg, 2002). As a result, without some type of supplement, formula #1 will likely result in delayed growth rates compared to cubs raised on a more nutrient dense formula, or maternally raised cubs.

The point of the above example is to demonstrate that formulas are not equal when it comes to determining feeding schedules. Offering 15-20% body wt/day is appropriate for formulas that provide adequate nutrient and energy concentrations, but may not be sufficient with less nutrient dense formulas.

Many facilities have indicated that chicken or turkey baby food should be added to the formula early on in the hand-rearing process. The addition of baby food will provide supplemental protein and fat. Chicken and turkey are reportedly good sources of taurine (Hedberg, 2002; NRC, 1986). One jar (2.5oz.) of Gerber's® chicken 2nd foods contains 12.9% solids, 11.8% protein, 4.1% fat, 1.47% carbohydrates, 0.6% calcium, 0.09% phosphorus and 15 IU vitamin A and provides 66 kcal (USDA 2004). Taurine was not listed in the analysis. Gerber's® 2nd foods, turkey-flavored, is also a good source of protein and fat, and very low in carbohydrates. However, the calcium: phosphorus ratio is skewed towards phosphorus (1:6.5) so may alter the total Ca:P ratio of the diet to the point of requiring a calcium supplement.

Panthera spp. have benefited from the addition of poultry-based human baby food (e.g. Gerber's® 2nd foods), as early as one to two weeks of age. The baby food provides additional protein and calories, but should be limited to less than 17% (2.5oz baby food to 12.5oz prepared formula) of the diet (Hedberg, 2002). Baby food must be added gradually over one week to prevent digestive upset. This is not considered part of the weaning diet, but as an addition to the formula which increases protein, fat and calories to otherwise dilute formulas. Knox® gelatin has also been added to formulas to increase the protein content (D. Strasser, pers. com.).

It is not advisable to add meat-based baby foods to nutrient-dense formulas such as those presented in Table 3. Laurenson (1995) stated that wild cheetah cubs had physiological limits on growth even when an unlimited food supply was available. However, the addition of protein and calories may promote a faster than optimal growth rate and contribute to potential bone growth abnormalities. Cubs that are consistently growing at $>10\%$ body wt/day may need to have their formula diluted to slow their growth. Fast growth promotes bone deformities and fractures because they are not able to support the additional body weight.

Compensatory growth, a phenomenon where young and/or malnourished animals are taken from a low plane of nutrition to a high plane with little or no transition period, has resulted in Degenerative Orthopedic Disease (DOD) in domestic horse foals and dogs (Owen, 1975; Hedhammer, et al, 1974). Factors that predispose animals to DOD include a combination of genetics, high energy intake and an early slow growth followed by a compensatory fast growth spurt (Lewis, 1995). There is a possibility that compensatory growth may contribute to the "ballet" stance that periodically develops in hand-raised cheetah cubs.

Wild cheetah cubs have average growth rates of 37 – 62.4g/day (1.2-2.1 oz.) (Laurenson, 1995, Beekman, et al, 1999; Wack et al, 1991). The recommended average daily weight gain (ADG) goal

for hand-reared cheetah cubs is approximately 5% body weight while on milk formula, and 8-10% increase per day after solid foods are introduced (Hedberg, 2002). Formulas and weaning diets that do not match these goals may need to be modified in one or more ways to ensure proper growth rates of cubs.

Calculations associated with feeding schedules

The following calculations are provided to assist the caretaker in determining how much and how often the formula should be fed to provide adequate nutrition, energy and optimal growth rates.

The Basal Metabolic Rate (BMR) or Basal Energy Requirement (BER) is the amount of energy (kcal) an animal needs for basic metabolic function at rest in a thermoneutral zone. In other words, the amount of calories it needs to stay alive, without having to use energy to maintain normal body temperatures. The formula to determine the BER/BMR is: $70 \times \text{body wt (in kg.)}^{.75}$ (Kleiber, 1947). For a 600g. (0.6kg) cub, the BER would be: $70 \times 0.6^{.75} = 47.72 \text{ kcal/day}$.

Once we have the BER, we can determine the Maintenance Energy Requirement (MER). This determines the amount of calories the animal needs to function in a normal capacity at its life stage. For adults in the maintenance life stage, the BER is multiplied by 2. For infants that have a higher metabolism and are developing and growing, the BER is multiplied by 3 or 4 (Evans, 1987), depending on the species and other factors. The MER factor of 3 is appropriate for cheetahs that grow at a slower rate than small mammals.

The stomach capacity for most placental mammals is 5-7% of the total body weight (Meehan, 1994). Convert the body weight into grams to find the stomach volume in mls (cc's). To calculate the stomach capacity in ounces, convert body weight into the same units (30g ~ 1 oz). The key is to make sure units are the same for body weight and stomach volume. The stomach capacity is the amount of formula a cub can comfortably consume at one feeding. Offering much more than this value may lead to overfilling, which may lead to stomach distension and bloat. It also prevents complete emptying of the stomach between feedings and promotes the overgrowth of potentially pathogenic bacteria, diarrhea and enteritis (Evans, 1987).

The following calculations will determine the total volume and kcal to feed/day, as well as the amount of formula/feeding and the total number of feedings/day.

1. Calculate Maintenance Energy Requirement (MER): $70 \times \text{body wt (kg)}^{.75} \times 3$. See Appendix 1 for calculated MER's for various body weights.
2. Determine stomach capacity (amount that can be fed at each meal): $\text{Body weight (in grams or ounces)} \times 0.05$.
3. Divide MER (number of calories required per day) by number of kcal/ml in the formula to determine the volume to be consumed per day. This value can be converted into ounces, by dividing it by 30.
4. Divide ml (or oz.) of formula per day by volume to be consumed at each meal (stomach capacity). This gives the number of meals to be offered per day.

Example: 600 gram (0.6 kg) cub

1. $\text{MER} = 70 \times 0.6 \text{ kg}^{.75} \times 3 = 143 \text{ kcal/24 hr. period}$
2. $\text{Stomach capacity} = 600\text{g.} \times 0.05 = 30 \text{ ml/feeding}$
OR: $20\text{oz} \times 0.05 = 1 \text{ oz/feeding}$

******The following calculations are based on a milk formula that provides 1.26 kcal/ml. Formulas that provide more or less energy will result in different volumes of formula per feeding and number of feedings/day. A formula that provided 0.69 kcal/ml would require 207 ml of formula per day given over seven feeding bouts.

3. $\frac{143 \text{ kcal}}{1.26 \text{ kcal/ml}} = 113 \text{ ml of formula to be offered in 24 hr. period (approx. 20\% bw)}$
4. $\frac{113 \text{ ml}}{30 \text{ ml/feeding}} = 3.76 \text{ feedings (round up to 4)}$

The cub in the above example would receive 30 ml (1 oz.) of formula at each feeding and would be fed four times over the course of the day. The total amount offered in 24 hrs. is approximately 20% of the cub's body weight. The number of feedings would be split by whatever time period caretakers are able to feed, with a minimum of three hours and maximum of eight hours between feedings. In the above example, if the time frame for feeding was 16 hours, the cub would be fed every four hours with an eight-hour break at night.

It is not unusual for infants to feed well at one meal and consume very little at another. Whatever is not consumed at individual meals can be made up by an additional meal later in the day. It is important to note that if a cub is expected to consume 30 ml at one meal, but only takes in 15 mls, the deficit cannot be made up by offering 45 ml at another feeding. Even if the cub wants to take more than the calculated stomach capacity volume, it must be limited to that amount. Overfeeding may cause bloat and allow for pathogenic bacteria to proliferate in the digestive tract, which will increase the risk of diarrhea, gastric distension and enteritis (Evans, 1987). When cubs are hungry, many times they finish their bottle before the feeling of satiety occurs, but are sound asleep 10-20 minutes later. If the cub is still hungry after it has received its designated volume, shorten the time period to the next feeding by an hour.

With a very young or weak cub, it would be advisable to feed smaller amounts more frequently, although it is generally not necessary to feed more often than every three hours. Frequent feedings that cause the cubs to be repeatedly awakened is actually more stressful than letting them sleep for longer periods (Meehan, 1994). Generally, healthy cubs will start to get restless when they get hungry, which can be used to gage how frequently they need to be fed. In the wild, reports have indicated mother cheetahs may regularly stay away for nine hours between feedings without ill effect to the cubs (Laurenson, 1993).

Formulas

Pet AgTM manufactures KMR[®], Esbilac[®] and Multi-Milk[®]. Multi-milk[®] is a formulated powder with a very low carbohydrate content. Adding it to either KMR[®] or Esbilac[®] will maintain high levels of protein and fat while keeping the total carbohydrate content to a minimum. Table 3 provides two formulas using Multi-Milk[®]. One combines it with KMR[®], the other with Esbilac[®]. The nutrient compositions are very close to cheetah maternal milk.

Table 3a: KMR[®]-based recipe for a cheetah hand-rearing milk formula

Formula Component	AF basis	DM basis
KMR (42/25): 1 part	Total solids: 22.4%	
Multi-milk (30/55): 1 part	Protein: 8.9%	39.7%
Water: 2 ½ parts	Fat: 9.5%	42.4%
	Carb: 2.5%	11.2%
	Ash: 1.5%	6.7%
	Calcium: 0.3%	1.4%
	Phosphorus: 0.2%	1.0%
	Magnesium: 0.02%	0.08%
	Kcal/ml: 1.26	5.63

AF = as fed, DM = dry matter

Table 3b: Esbilac®-based recipe for a cheetah hand-rearing milk formula

Formula Component		AF basis	DM basis
Esbilac (33/40): 1 ½ parts	Total solids:	23.0%	
Multi-Milk (30/55) : 1 part	Protein:	7.9%	34.2%
Water : 3 parts	Fat :	11.2%	48.8%
Taurine: 250mg/cub/day	Carb:	2.6%	11.2%
	Ash:	0.8%	3.5%
	Kcal/ml	1.4	6.0

As with all milk formulas, the ones described above should be diluted for the initial feedings and gradually increased in concentration until given as a straight stock formula. In an ideal situation, the cub would receive 2-3 feedings of electrolytes only, then a diluted milk formula (1:4 ratio of mixed formula: water) for 2-3 feedings, then 1:3 dilution for 24 hours, then the 1:2 dilution for 24 hrs, 1:1 dilution for 24 hrs, then the full-strength stock formula on the 5th day and from then on. However, in the real world, things don't always work out as planned. Cubs may periodically need to stay on a dilution a little longer, particularly when going from the 1:1 dilution to the full-strength formula. Intermediate steps may need to be added, such as going from 1:1 to 2:1, then full-strength to give the cub more time to adjust. Occasionally cubs need to take a step back if diarrhea occurs. For example, if the cub does well on 1:2 then develops loose stool on the 1:1 dilution, which gets worse at each feeding, delete the next feeding, give electrolytes (at 5-7% body wt) for 1-2 feedings, then go back to the 1:2 dilution step. Offer that formula for 2-3 feedings and progress to 1:1.5 if the stool improves. Healthy infants tend to resolve digestive upset/loose stool pretty quickly when dealt with appropriately. Compromised infants may have other issues that are compounding the problem. They may be stressed and immuno-suppressed. They may have bacterial or viral infections, particularly if they didn't receive colostrum before being removed from the mother. They may have parasites. Or there may be other factors that are adding to the cub's stress level which hampers its ability to adapt and adjust to the hand-rearing process. This is where the "art" of hand-rearing comes in, and the caretaker must make various adjustments to help an individual cub do its best.

Because the carbohydrate content of the full-strength formulas listed in Table 3 is lower than that of cheetah milk, digestive problems should not be an issue. However, our ability to provide appropriate diets is limited by our knowledge at any point in time. Therefore, there is always the potential for new dietary issues to arise. One factor that has been reported is lactobezoars (milk clots in the abdomen) in cheetahs cubs. The cause of this condition is unknown. One facility indicated they thought the milk formula was too concentrated. However, at the time of the lactobezoar incident, they were feeding KMR® liquid as their stock formula, which was high in carbohydrates. Bloating and lactobezoars in two hand-reared polar bears was associated with a milk formula high in carbohydrates (Kenny, et al, 1999). The abdominal distension in the cheetahs may have been caused by fermentation of undigested carbohydrates.

The inability to digest certain types of fatty acids might also contribute to lactobezoars. Prior to 1993, Pet Ag™ used coconut oil as their fat source in the KMR®, Esbilac® and Multi-Milk® recipes. In 1993, the ingredients were changed and they replaced coconut oil with butterfat. The change was made due to research indicating butterfat was more digestible in domestic dogs and cats. However, wildlife rehabilitators and zoo facilities which hand-raised infants noticed that various species were developing digestive problems, even though the caretakers were using the same recipes as before. Lactobezoars were reported in tigers and leopards (Hedberg, 2002). Coconut oil has a high concentration of medium-chain fatty acids, which are generally more digestible than the long-chain fatty acids present in butterfat (Robbins, 1993). Wild felids may not be able to digest butterfat as easily as coconut oil.

Caretakers also reported that the new formula was difficult to mix and had a greasy residue. Pet Ag™ responded to the situation by marketing the Zoologic Milk Matrix® line of milk formulas. It is essentially the pre-1993 version of their milk formulas, and contains coconut oil instead of butterfat as the fat source. Therefore, the Milk-Matrix® version of KMR®, Esbilac® and Multi-Milk® may be preferable products to use in cheetah hand-rearing formulas, especially if lactobezoars are a concern.

The Milk Matrix® line uses formula numbers, which refer to the concentration of protein and fat, as the product names.

KMR® = Milk Matrix® 42/25
Multi-milk® ≈ = Milk Matrix® 30/55
Esbilac® = Milk Matrix® 33/40

From personal experience, the Milk Matrix® line is easy to mix when the powder is added to cold water in equal parts and stirred in a “whisking” fashion. Then the additional water is added to the slurry and mixed completely. There are usually a lot of air bubbles right after mixing, but they dissipate within a few hours. The consistency is much thicker when the formula is cold, and thins out significantly when heated to 100°F (37.77°C). The formula must be refrigerated between feedings.

Many mammalian species lack the enzyme lactase which breaks down milk sugar (lactose) into glucose for absorption into the cells. Gas build-up in the gastrointestinal tract and diarrhea can result as the undigested sugar ferments in the small intestine. Species that have low carbohydrate levels in the maternal milk are generally considered lactose-sensitive or lactose-intolerant. Because commercial milk formulas made for domestic dogs and cats are generally higher in carbohydrates than the maternal milk of the species we’re feeding, modifications to the diet are required to prevent digestive distress. Methods used to deal with this issue include:

1. Diluting the formula to reduce the amount of carbohydrates from being consumed
2. Including Multi-Milk® in the recipe to reduce the carbohydrate content
3. Adding lactase enzyme or lactose-eating bacteria (e.g. *Lactobacillus*) to the formula

Growth rates in hand-reared cubs

Hand-reared animals typically have a delayed growth rate compared to maternally-raised cubs. There are many factors which contribute to that.

1. Cubs receive maternal antibodies *in utero* (before birth), in the colostrum and in the milk. Mother-raised cubs receive considerably more passive immunity to a variety of pathogens than the hand-reared cubs.
2. Many times, hand-reared cubs are pulled because they are poor-doers and are nutritionally and/or immunologically compromised from the start, and simply don’t have the ability to make up for lost time.
3. The hand-rearing formula, no matter how nutritionally sound it appears, is restricted to the nutrients in the powder mixes. As we learn more about nutritional idiosyncrasies of each species, we find that many times the form of protein, fat or carbohydrate in the artificial formula is not compatible with those in the maternal milk, and may not be as digestible. All we can do is our best with what we know at any given time. Over the years, milk formulas have improved vastly, and will no doubt continue to improve in the future.
4. Formulas given are not nutritionally balanced or are deficient in one or more major nutrients such as protein and fat. An average weight gain of approximately 5% body weight while on milk formula and 8-10% weight gains during the weaning process are the targets (Hedberg, 2002). There will always be some fluctuation where there may be a 2% gain one day and 8% the next. So the key is to see what the average is over a period of 3-5 days. If the cub is consistently maintaining weight for several days or only has slight gains, the formula composition and feeding schedule should be evaluated. Barring any health problems to explain a delayed growth rate in an individual, low weight gains are generally related to a diet that is not meeting the caloric and/or protein requirements.
5. Cubs that are weak may not have the energy to consume the target volume of formula at each feeding. In these cases, small, frequent feedings and the addition of LRS+ 2.5% dextrose given subcutaneously (SQ) may be more appropriate. Weak cubs may also take longer to transition onto the stock formula because of weakened organ function. Close monitoring of these cubs is warranted to ensure they begin gaining weight as soon as feasible, without stressing their immune system any more than necessary. Even in these cases, the cubs should ideally be on a formula at 80-90% full strength concentration within five days and possibly another two days to get to the full-strength stock formula. If diarrhea occurs when these cubs go onto the full-strength formula, they may do better on a 2:1 or 3:1 dilution (full-strength formula: water) as their stock formula.

Appendix 1: Calculated values for Kcal/day and ml/feeding

Weight	ME (Kcal/day) [70 x bw (kg) ^{0.75} x 3]	ml/feeding (Stomach capacity)
450g. (15 oz.)	115 kcal/day	22.5 ml/feeding
500g.	125	25.0
550g.	134	27.5
600g. (20 oz.)	143	30.0 (1 oz.)
625g.	148	31.25
650g.	152	32.5
675g.	156	33.75
700g.	161	35.0
725g.	165	36.25
750g. (25 oz.)	169	37.5
775g.	173	38.75
800g.	178	40.0
825g.	182	41.25
850g.	186	42.5
900g. (30 oz.)	194	45.0 (1½ oz)
950g.	202	47.5
1.0 kg. (2.2 lb)	210	50.0
1.1 kg.	225	55.0
1.2 kg.	241	60.0 (2 oz.)
1.3 kg.	256	65.0
1.4 kg.	270	70.0
1.5 kg. (3.3 lb)	285	75.0 (2½ oz)
1.6 kg.	299	80.0
1.7 kg.	313	85.0
1.8 kg.	326	90.0 (3 oz.)
1.9 kg.	340	95.0
2.0 kg. (4.4 lb)	353	100
2.1 kg.	366	105 (3½ oz)
2.2 kg.	379	110
2.3 kg.	392	115
2.4 kg.	405	120 (4 oz.)
2.5 kg. (5.5 lb)	418	125
2.6 kg.	430	130
2.7 kg.	442	135 (4½ oz)
2.8 kg.	455	140
2.9 kg.	467	145
3.0 kg. (6.6 lb)	479	150 (5 oz.)

*A complete hand-rearing manual is available by request from the author at zoonutrition@msn.com.

Cheetah Fast Facts

- In the wild Cheetahs don't often drink water as they get the moisture they need from the bodies of their prey.

Hand-rearing wild neonates is part "art" and part science. Over the years, neonate caretakers have given a variety of infant diets, some of which were nutritionally sound, and some were not. As our knowledge increases, so must the quality of the diet we provide. Many times animals "seem" to do fine on a particular milk formula, but when compared to maternally-raised infants are smaller and less robust. Because there are many individual idiosyncrasies of infants that contribute to the "art" of hand-rearing, providing diets that are the most nutritionally sound should contribute to the healthiest cub possible.

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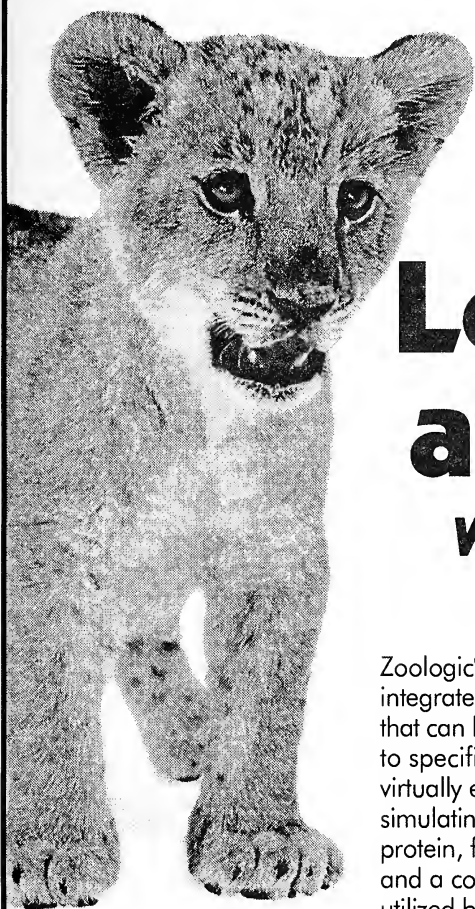
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References

- Abrams, J.T. 1950. Linton's Animal Nutrition and Veterinary Dietics, 3rd Ed. W. Green and Son.
- Beekman, S.; Kemp, B.; Louwman, H.; Colenbrander, B. 1999. Analyses of factors influencing the birth weight and neonatal growth rate of cheetah (*Acinonyx jubatus*) cubs. *Zoo Biology* 18:129-139.
- Bechert, U.; Mortensen, J.; Dierenfeld, E.; Cheeke, P.; Keller, M.; Holick, M.; Chen, T.C.; Rogers, Q. 2002. Diet composition and blood values of captive cheetahs (*Acinonyx jubatus*) fed either supplemented meat or commercial food preparations. *Journal of Zoo and Wildlife Medicine* 33(1):16-28.
- Ben-Shaul, D.M. 1962. Composition of milk of wild animals. *International Zoo Yearbook* 4:333-342.
- Evans, R.H. 1987. Rearing orphaned wild mammals in Vet Clinics of North America 17(3): 754-784. W.B. Saunders. Philadelphia, PA.
- Evans, R.H. 1987. Rearing orphaned wild mammals in Vet Clinics of North America 17(3): 754-784. W.B. Saunders. Philadelphia, PA.
- Hedberg, G. 2002. Exotic Felids in Hand-rearing Wild and Domestic Mammals. Gage, L., ed. Iowa State Press, Ames, Iowa. Pp. 207-220.
- Hedhammer, A.; Wu, F.; Krook, L. et al. 1974. Overnutrition and skeletal disease. An experimental study in growing Great Dane dogs. *Cornell Vet.* 64 (Suppl. 5): 1-160.
- Kenny, D.E.; Irlbeck, N.A.; Eller, J.L. 1999. Rickets in two hand-reared polar bears (*Ursus maritimus*) cubs. *Journal of Zoo and Wildlife Medicine* 30(1): 132-140.
- Kleiber, M. 1947. Body size and metabolic rate. *Physiological Review* 27:511-541.
- Laurenson, M.K. 1995. Cub growth and maternal care in cheetahs. *Behavior Ecology* 6(4):405-409.
- Laurenson, M.K. 1993. Early maternal behavior of wild cheetahs: implications for captive husbandry. *Zoo Biology* 12:31-43.
- Lewis, L.D. 1995. Equine Clinical Nutrition: Feeding and Care. Williams and Wilkins. Baltimore, MD.
- McManamon, R.; Hedberg, G. 1993. Practical tips in nursery rearing of exotic cats. *Journal of small and exotic animal medicine* 2(3): 137-140.
- Meehan, T. 1994. Handrearing Felids in AZA Infant Diet Notebook. American Zoo and Aquarium Assoc. Silver Springs, MD.
- National Research Council (NRC). 1986. Nutrient Requirements of the cat. National Academy of Sciences., Wash, D.C.
- Owen, J.M. 1975. Abnormal flexion of the corono-pedal joint of "contracted tendons" in unweaned foals. *Equine Veterinary Journal* 7:40-45.
- Robbins, C.T. 1993. Wildlife Feeding and Nutrition. Academic Press, San Diego, CA.
- Strasser, D. Cincinnati Zoo and Botanical Gardens. *personal communication*
- USDA. 2004. National Nutrient Database SR17. Food composition of poultry and game animal products. www.nal.usda.gov/fnic/foodcomp
- Wack, R.F.; Kramer, L.W.; Cupps, W.; Currie, P. 1991. Growth rate of 21 captive-born, mother-raised cheetah cubs. *Zoo Biology* 10:273-276.



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Coursing Cheetahs

By Stephanie Jochum-Natt, Feline Keeper
Utah's Hogle Zoo, Salt Lake City, Utah

Finding enrichment items that our two male cheetahs (*Ainonyx jubatus*) will respond well to is always a challenge. Usually a pinata zebra or diced cantaloupe in a cardboard box keeps them occupied for some time, but we wanted to provide them with something that would really bring out their "need for speed." Since cheetahs react well to moving enrichment devices, we thought that a coursing lure would be the perfect item.

We researched what type of lure coursing equipment would work in our exhibit. We spoke to several zoos that use pre-fabricated systems or in-house manufactured systems. Because coursing lures are expensive, for several years we sought out individuals and hobby groups to donate time and resources to make a lure system. Although there was interest, it never worked out due to the project being such a time-consuming task. We eventually decided that it would be best for us to purchase a complete coursing system from Injoy Lure Coursing Equipment® located in Vermont. They manufacture coursing systems for domestic dog coursing programs and many zoo facilities use their products for cheetahs. A complete system costs between \$700 to \$1200 or more. We began to pursue sponsorship for purchasing a system for our cheetahs.

Utah's Hogle Zoo holds its annual Gala fundraiser event every autumn. In 2003 our Behavioral Enrichment Coordinators, Dawn Neptune and Deana Walz, had an enrichment sponsorship booth at the Gala. The BE Coordinators designed giant posters with photos of enrichment devices guests could purchase for the Zoo's animals. One of the posters had all the information about the Injoy Æ coursing lure and why we felt it was important for our cheetahs. Deana and Dawn talked all evening to the guests about the need for enrichment items and how the animals might react to a particular device. All their hard work paid off, not only did the guests sponsor several devices, but one guest also donated enough funds to purchase the entire \$1,200 lure coursing system for the cheetahs. We ordered a system which included a wheel, motor, nylon string line and about a dozen pulleys to hold the line in place. A battery had to be purchased separately. We chose to purchase a marine battery to run the motor, because a marine battery is designed to be drawn down and recharged many times. A continuous run course system was chosen over a single run system. In our opinion a single run course would be over too quickly for the cats.

The initial setup of the system took about two hours, and included several keepers and the Zoo Foreman to figure it out and get it running correctly. The key was to get the correct tension on the nylon line to handle the continuous loop run. If the line was too tight it would break; if it was too loose it would slip off. We used a piece of white plastic bag tied to the line as the lure; it was light and flapped to get the cat's attention.

The first course was laid out in the exhibit yard in a large circle. The motor and battery were set up outside the exhibit where we stood. When the cats were let into the yard with it set up for the first time, we let them inspect all the parts before we ran the lure. We controlled the speed of the lure with a push button on a cord attached to the motor. When the lure moved it startled the cats for a moment. Eventually the smaller cheetah took off after it. After watching his brother for awhile, the other cheetah decided to chase the lure too. The course was in a small section of the yard, so the cats could only jog fast for a few seconds at a time. They were not able to reach a full run. To keep the cats interested we alternated the speed of the lure, running it slowly, creeping it along and speeding it up. After about 20 minutes, both cheetahs were winded and too exhausted to chase it any more.

With practice setting up the courses throughout the summer of 2004 we learned how to reduce the set-up time and how to fix a broken line quickly. We were very proud of ourselves. Experimenting with the set-up and speed of the lure machine, we discovered a few problems we needed to change.

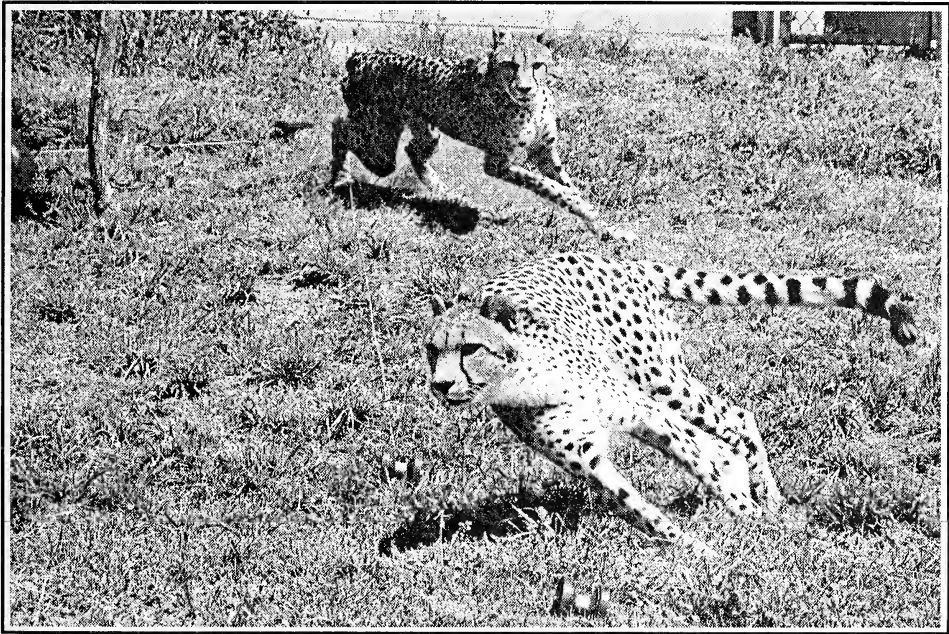
First, the line would break or get caught up in the wheel, so we chose a smaller piece of plastic bag for the lure to prevent it from getting caught, and we made sure that the line had the correct tension.

Our cheetahs shift reliably into the barn, which made it easier to go in and fix a broken line to run the course for them again.

Second, the cats did figure out the course of the layout quickly and would wait at a certain spot for it instead of chasing it. In the future we may decide to solve that problem by purchasing a continuous loop wheel that can be used to reverse the direction of the course.

Third, when a cheetah stood on the line we had to stop the lure machine and re-start it after the cheetah was clear of the line to prevent injuries to its feet or ankles. We also found that if the course had too many tight turns or sharp angles, a running cheetah could easily trip the line and even jump it off of a pulley. To help prevent this, we kept the course wide and round or placed it close to the exhibit mesh so they could only run on one side of the line, and not jump over the line.

Fourth, we discovered that the exhibit yard had many low and high spots that required placing the pulleys perfectly to prevent the line from being too far off the ground where it could potentially become a trip hazard. To help problem solve and determine how to make improvements, we videotaped and photographed each course and took notes on what worked or what needed changing.



Coursing Cheetahs at Hogle Zoo (photo by Jameson Weston)

During the summer of 2004 we ran the lure for the cheetahs one to two times a month and highlighted it on Enrichment Day and our AAZK Chapter's annual "Cheetah Cha Cha" fundraiser for the Cheetah Conservation Fund. Each time we coursed the cheetahs, large crowds of guests and Zoo staff lined up to watch. Meet-A-Keeper programs were set up to talk to the public about the importance of enrichment and describe what behaviors they were seeing from the cheetahs during their interaction with the lure. It was a great opportunity to educate people about cheetahs. We also displayed a sign explaining how a zoo guest had sponsored the purchase of the coursing equipment, and how other guests could help fund our enrichment program. Later that year another Zoo guest purchased a half dozen more pulleys for us, which will allow us in to create an even larger course than before. Overall, acquiring the lure coursing system proved to be an exciting enrichment device for the cheetahs, the staff and the guests.

For Purchasing Information Contact: Tom Bianchi, Injoy Lure Coursing Equipment, P.O. Box 21, Charlotte, VT 05445. Tel. (802) 425-3691 FAX (802) 425-4468 Website: www.injoy-1.com

Morbidity and Mortality in Hand-Reared Cheetah Cubs

By

Katherine Bell, Hand-Rearing Project Leader

Cheetah Outreach and De Wildt Cheetah Research and Breeding Centre, South Africa

Abstract

The mortality rate of artificially-reared cubs may be as high as 50% (Grisham, 1989; Kriek et al 1998) in some facilities. With only 20% of captive cheetahs known to reproduce (Marker-Kraus 1997) this mortality is a significant loss to the captive population. Noteworthy progress has been made since the earliest records of hand-rearing cheetahs, whereby mortality rates have been reduced from as high as 89% in the 1970's, to 37% in 1998 (CCF, 1998).

However, this figure is still high and evaluation of the major causes of death suggests a key role for husbandry and environmental factors in modern cub mortality. Congenital defects and stillbirths make up only a quarter of all cub deaths reported (CCF, 1998) whilst nutritional deficiencies, disease and infection, hypothermia and other husbandry-related events are among the remaining causes of death in cubs under the age of six months (CCF, 1998). Additionally, the role of management in so-called "natural" or "unavoidable" causes such as maternal abandonment and cannibalism, (accounting for 36% of deaths), must not be overlooked.

This paper does not purport to serve as a husbandry protocol (of which there are numerous), but instead examines the major problems reported during the hand-rearing of cheetah cubs. Review is made of the reported causes of morbidity and mortality among cheetah cubs, including congenital defects, nutritional deficiencies, gastrointestinal disturbances, immunological dysfunction, hypothermia and infectious pathogens. In association with recommended prophylactic schedules (i.e. vaccination and parasite control), appropriate sanitation, nutrition, careful monitoring of cub health and growth rate is likely to significantly improve cub survivorship.

Introduction

Cheetahs were first kept in captivity over 4000 years ago by the ancient Egyptians who used tame cheetahs as hunting companions and noble gifts (Hunter and Hamman, 2003). However, despite a long history of cheetahs in zoological facilities and private animal collections, it was not until 1956 that cheetahs were bred successfully in captivity (CCF, 1998). This litter did not survive past three days of age and although the earliest report of successfully hand-reared cheetah was from a European zoo in 1960, (Encke, 1960) it took another 10 years for the zoological community to report the successful rearing of a litter by its mother (CCF, 1998). Even today, only 15 - 20% of the captive cheetah population has reproduced, contributing significantly to the disproportionate genetic representation occurring within this population (CCF, 1998; Marker-Kraus, 1997; O'Brien et al, 1985).

Cubs are removed from their mother prior to weaning for a variety of reasons, including maternal neglect, injury, disease or for training/educational functions. Lombardi et al (2001) report that 75% of hand-reared cubs between 1964 and 2000 were removed due to illness or neglect, at an average age of seven days, and 24% of these cubs did not survive. The remaining 25% were healthy cubs, removed for educational purposes when much older (on average, 26 days) (Lombardi et al, 2001). It is not surprising that this latter proportion of cubs suffered a far lower mortality rate (4%) than cubs removed for medical reasons (Lombardi et al, 2001).

Infant Mortality

Neonates lack the reserves of adult animals and may show only slight changes in disposition prior to rapidly becoming moribund (Meier, 1986). The susceptibility of neonatal cheetahs is emphasized in the literature with infant mortality as high as 89% in the 1970's and 52% in the 1980's (CCF, 1998). With greater understanding of cheetah physiology, improved husbandry practices and increased inter-facility reporting, infant mortality rates among captive cheetahs have decreased significantly since then (CCF, 1998). However, the most recent statistics show that 36.7% of cheetahs still die before reaching adulthood and 23% of cubs die within their first year of life (CCF, 1998).

Causes of death are as varied as the reasons for removal from the mother, with nearly a quarter of cubs dying of unknown causes prior to 30 days of age (CCF, 1998). The difference between what may be termed “natural” deaths (i.e. congenital defects or stillbirths) and “environment-related” deaths (i.e. maternal neglect, cannibalism, nutritional deficiencies, exposure and trauma) is stark. O’Brien *et al* (1985) have suggested that genetic homozygosity is primarily responsible for high infant mortality rates in this species, although this conclusion has been strongly debated by other authors (Caro *et al*, 1987; Laurenson *et al*, 1995). Only 5% of deaths are due to congenital defects and 20% to stillbirths (CCF, 1998). However, as much as 51% of deaths were due to “environmental” causes (CCF, 1998) and the greater part of many medical conditions may be due to environmental and husbandry issues (McManamon, 1993). It is noted that maternal neglect and cannibalism may be considered as “natural” causes of death. However, the frequency of these mortalities in free-ranging, mother-reared litters is much lower than in captivity (8.2% and 17%, respectively, in the case of maternal neglect) (Caro, 1994; Laurenson, 1994). Maternal neglect is frequently associated with stress in both free-ranging and captive cheetahs (Caro, 1994; CCF, 1998; Laurenson, 1994). Captive females exposed to predator species within sight or smell of cubbing den, or housing with other conspecifics (specifically males) are more likely to abandon or cannibalize their cubs (CCF, 1998). These findings make it more likely that environmental, rather than innate, factors underpin these common causes of infant mortality in captivity. Nonetheless, environmental factors and genetics cannot be examined in isolation and large inter-facility variation in infant mortality may be the combined result of genetic lineages and husbandry factors (Marker-Kraus, 1997).

Marker-Kraus (1997) determined that the most vulnerable age for captive cheetahs is the period between birth and one month of age. The first six weeks of life are particularly important, as cubs are unable to efficiently thermo-regulate, are relatively immobile, unable to pass urine or feces without ano-genital stimulation, and commonly have an intestinal parasite burden after *in utero* transfer. Between 1956 and 1994, 21% of infant deaths were seen in cubs less than one month of age, and 28% in cubs less than six months of age, which is much higher than the values reported for other non-inbred zoo animals (Marker-Kraus, 1997). Yet, encouragingly, a recent survey of 15 North American facilities reported a mortality rate of only 19% in hand-reared cubs prior to three months of age (Lombardi *et al*, 2001).

A second period of susceptibility to disease may exist in captive situations for cubs between four to seven months of age. After four months of age, typical vaccination schedules should be completed and this may be the time that cubs are introduced into novel environments and therefore exposed to novel pathogens. Diarrhea is especially common in this age group (Caldwell, 2004). After approximately seven months of age, risk of infection appears to decrease as cub resistance matures.

Congenital defects

4.1% of free-ranging cubs deaths were recorded as due to the cubs being “unviable” (Caro, 1994), presumed to suffer some form of congenital defect, which is remarkably similar to the 5% reported in captivity (CCF, 1998). Failure of cubs to develop a suckling instinct may be indicative of central nervous system dysfunction, whilst palate deformities may also result in suckling difficulties (Weilemann, 1962). Milk seen expelled from the cubs’ nose or mouth during suckling is often caused by cleft palate and the cub should be checked accordingly. Mother-reared cubs suffering congenital defects may be cannibalised prior to examination by zoological staff and as such the nature of many congenital defects is not described in the literature.

Nutritional Deficiencies

Nutritional deficits caused death in 7% of cubs born between 1829 and 1994 (CCF, 1998). Nutritional disorders are typically seen at approximately four to six months of age (i.e. the natural time of weaning) (CCF, 1998). One of the most common types of nutritional disorders is the imbalance of dietary calcium and phosphorus, commonly presenting as developmental bone malformation (osteodystrophy) due to insufficient supply of dietary calcium (CCF, 1998). Alternatively, excessive supplementation of calcium is known to contribute towards a developmental deformity of the forelegs (osteochondrosis dissecans), which is evident in forward bowing and outward turning of the paws, termed carpal valgus (CCF, 1998). The role of nutrition in metabolic bone disease is well covered in the literature. Investigation of the role of nutrition in carpal valgus of hand-reared cubs is currently underway by the author.

Post mortem examination of cubs at a South African facility suffering mortality rates in excess of 85% over a period of 18 months revealed clinical signs and lesions indicative of congenital vitamin E and selenium deficiency (Kriek et al, 1998). Concurrent *Salmonella* infections were deemed secondary in nature (Kriek et al, 1998), as it is likely that nutritional inadequacies rendered the animals' immune systems incapable of mounting sufficient defence against opportunistic parasites and pathogens.

Lethargy, ataxia and ventroflexion of the head are often seen in the critical stages of thiamine deficiency, whilst seizures and periods of tachycardia or bradycardia may also be exhibited (NRC, 1986). Although no dietary analyses were reported, the characteristic symptoms and response of surviving animals to parenterally administered thiamine led to the belief that thiamine deficiency was primarily responsible for a number of cheetah deaths at one Australian facility (Christie, 1997).

Hoff (1960) reports the occurrence of head tremors in hand-reared exotic felines between 10 – 20 days of age. Lateral head tremors in association with ataxia, partial collapse, loss of balance and a staggering gait are among the known symptoms of copper deficiency (CCF, 1998; Downes, 1997) and the condition has resulted in fatal respiratory distress in some cubs (Downes, 1997). Treatment with dietary copper is usually effective but chronic deficiency can render the effects permanent (CCF, 1998; Downes, 1997). Evaluation of chicken and guinea fowl carcasses demonstrated the greater copper content of the latter, suggestive of a wild-diet component capable of providing sufficient copper to growing cubs (Downes, 1997).

Exposure and Hypothermia

Abandoned cubs may be left outside of the den, where they are exposed to environmental elements and are at risk of pneumonia and hypothermia. Pneumonia is frequently reported as a major cause of neonatal death in North American facilities (Munson, 1993). Low body temperatures are often accompanied by low blood glucose (Reid and Meier, 1996). Although the central nervous system depends on glucose as its primary energy source, glucose requirements are reduced drastically during hypothermia (Reid and Meier, 1996). Sterile warm fluids administered *per os* and *per rectum* are efficient ways of raising the core body temperature, as well as stimulating gastrointestinal tract function (McManamon, 1993). However, during severe hypothermia, the gastrointestinal tract enzymatic systems function abnormally and as such hypothermic neonates should not be fed until core body temperature is returned to normal (Meier, 1986). In certain cases, bacterial overgrowth and bloat may result if milk formula or glucose is administered *per os*, whilst at best the formula is likely to be inadequately utilized by the cub (Meier, 1986).

Gastrointestinal Disturbance

Necrotizing enterocolitis, vomiting, ileus (gut stasis with bloat), severe parasite infestations and bacterial enteritis (e.g. salmonellosis) are the most serious of gastrointestinal disorders in neonates (Reid and Meier, 1996). Such problems can result in diarrhea, dehydration and electrolyte imbalances, all of which can quickly become fatal in young animals (Reid and Meier, 1996; CCF, 2000).

Diarrhea

Diarrhea represents one of the most common health problems in captive cheetah and is particularly prevalent in cubs under the age of seven months (Caldwell, 2004). Causes of diarrhea include ascarid infections, coccidiosis, giardia, trichomonas infection, dietary intolerance, environmental stress, enteric bacterial or viral infection, and lympho-plasmacytic enteritis (Caldwell, 2004). Identifying the cause of diarrhea, whilst treating the symptoms (i.e. fluid therapy), is an important step in treating diarrhea in cheetah (Caldwell, 2004).

Some commercial cat foods are known to result in chronic low grade diarrhea in cheetahs (Bell, 2004; Caldwell, 2004) and the addition of meat to these diets may see a return to normal stool consistency. If an animal's carbohydrate absorption ability is exceeded, the fermentative activity of gut enterobacteria upon the residue may result in osmotic diarrhea.

Often diagnosis of the cause of diarrhea can be made from dietary evaluation, fecal floatation for intestinal parasites, fecal smears and the nature of the stool (Caldwell, 2004). Diarrhea originating

in the small intestine commonly presents as large amounts of liquid stool being passed infrequently, ranging from light orange to reddish in color (Caldwell, 2004). A red mucous may be present around the feces and initial segments of feces may be relatively well formed (Caldwell, 2004). Black tarry feces is indicative of hemorrhaging in the upper intestinal tract, since blood present in the small intestine will be digested as it passes along the gastrointestinal tract, giving the characteristic black color.

Large intestine disorders are less responsive to treatment and present as small amounts of liquid feces being passed frequently (Caldwell, 2004). Fresh (red) blood seen in the feces is indicative of hemorrhaging in the lower intestinal tract (e.g. colitis). Ultrasound, abdominal palpation and endoscopies or mucosal biopsies may be required to diagnose some causes of diarrhea. However, since these are invasive procedures, often requiring sedation, they are generally avoided due to the risks of sedation in young cubs (Caldwell, 2004).

Starvation for 12 – 24 hours is common practice and typically produces good results for diarrhea of large intestinal origin (Caldwell, 2004; McManamon, 1993; Schumann and Schumann, 1994; Reid and Meier, 1996). Alternatively, formula may be diluted with oral electrolyte solution and the total volume decreased by 20-40% for 8 – 12 hours if diarrhea is not severe or persistent (CCF, 1998). Dietary changes should be made gradually and food offered in small amounts frequently so as to prevent overburdening the gastrointestinal tract. Reasonable success has been seen with diets of raw and/or boiled chicken, as well as with formulas such as Iams® (Caldwell, 2004) or Hills Science Diet® Intestinal Diet® (pers. obs., 2004).

A variety of pharmaceuticals are available for the treatment of diarrhea in cheetahs. However, indiscriminate use of antibiotics should be avoided due to the risk of bacterial resistance and disruption to normal gastrointestinal microflora (Caldwell, 2004; van Zyl, pers. comm., 2004). Stool binding agents should be used with precaution whilst gut-lining pharmaceuticals may be advisable where risk of gastric ulceration is apparent. Cheetahs appear to have a similar intestinal microflora composition to the domestic cat (Caldwell, 2004) and as such the administration of commercially available pro-biotic preparations (e.g. *Lactobacillus* supplements) to promote regrowth of commensal gut bacteria may be beneficial during recovery (McManamon, 1993; Schumann and Schumann, 1994; Reid and Meier, 1996).

Dehydration and Electrolyte Imbalances

Electrolyte and fluid replacement is essential in treating cubs with gastrointestinal disturbances as cubs are especially prone to dehydration (Caldwell, 2004; Schumann and Schumann, 1994). Signs of dehydration include skin tenting, prolapse of the nictitating membrane (third eyelid), dull coat, and lethargy (Caldwell, 2004).

Sodium deficits may cause convulsions, nausea, vomiting, anorexia, dehydration, and lethargy (Meier, 1986). Potassium deficits are also seen during illnesses involving vomiting or diarrhea and cause muscular, gastrointestinal and cardiovascular dysfunction (Meier, 1986). Conversely, excessive potassium induces symptoms such as restlessness, weakness and cardiac arrhythmias (Meier, 1986). Convulsions may also be due to calcium, glucose and/or magnesium deficiencies (Meier, 1986).

Internal Parasites

Internal parasites can cause diarrhea (CCF, 2000) and can be passed from mother to cub whilst *in utero*, via the milk or acquired soon after birth (Reid and Meier, 1996). Cubs may be infected with *Ascariasis* and *Ancylostomasis* before birth and typically exhibit symptoms such as weakness, poor weight gain, abdominal distension, dehydration, anaemia and bloody mucoid feces as early as three to four days of age (Meier, 1986). Whipworm infestations can be fatal and clinical symptoms of internal parasite infestations include loose, watery (sometimes bloody) feces, vomiting, anemia, fever, dehydration, weakness, inappetence, dullness and signs of abdominal pain (Reid and Meier, 1996). Tapeworm infections are not typically life-threatening. Diagnosis includes fecal examination and/or radiography (Reid and Meier, 1996).

Constipation

Young cubs require stimulation in order to defecate and urinate. Dietary changes, inappropriate stimulation or the ingestion of foreign material may cause constipation. Meconium (the first

feces) can also cause constipation, bloat, inappetence, and abdominal distress if not passed (Reid and Meier, 1996). A warm enema can typically rectify the problem (Reid and Meier, 1996).

Intestinal blockages caused by a heavy worm burden are not uncommon in young animals. Deworming animals with a heavy parasite burden should aim to provide a graduated elimination of parasites. Large infestations that are treated with heavy doses of anti-helminthic drugs may cause intestinal obstructions as the parasites die off at the same time (van Zyl, pers. comm., 2004).

Immune System Dysfunction

Cubs may gain a degree of passive immunity by the transfer of maternal antibodies via the placenta but colostrum appears to be a more significant source of immunoglobulins (Meier, 1986). A neonatal intestine can absorb intact immunoglobulins for up to 36 hours after birth but after that the colostrum will have only local effects on the intestine (Reid and Meier, 1996). After this period, cubs are particularly vulnerable to bacterial, fungal and viral pathogens.

The thymus plays an important role in cell-mediated immunity through the maturation and release of large numbers of T-lymphocytes into circulation (Ross et al, 1995). The organ is particularly important in early life as the humoral immune system is developing. Premature thymic atrophy (PTA) has been observed in increasing frequency at a South African breeding facility (Caldwell, 2004). Since diagnosis is typically only made upon post-mortem after death due to apparently non-immune related causes, PTA may represent an, as yet, unidentified problem within other facilities around the world, where post-mortems are either not performed or the thymus was not examined.

Symptoms such as chronic watery diarrhea, wasting, vomition, suppurative pneumonia and perforating gastric ulcers have been seen in cubs that were later found to suffer from PTA (Caldwell, 2004). The cause of death in these specific cubs was peritonitis as a consequence of the perforated gastric ulcer (Caldwell, 2004). Although the gastrointestinal pathology in these cubs resulted in their deaths, the lack of functional immune system is likely to have played a significant role in the initiating pathogens successful infection, or alternatively may have mediated auto-immune mechanisms.

Diseases associated with immune suppression such as candidiasis, bacterial enteritis, pneumonia and pleuritis are also reported causes of morbidity and mortality amongst cheetah cubs (Lane, 2004). Hence, the role of immunosuppressive factors is deserving of further research and the involvement of dietary factors such as antioxidants, isoflavones and selenium in the functioning of the immune system should also be addressed. Isoflavone-induced perturbations in immunology are currently under investigation by the author.

A degree of passive immunity can be obtained from the administration of antibody-containing serum (collected from an immunocompetent, FIP and FIV negative animal) (CCF, 1998). Alternatively or in addition to this, homeopathic, nutritional (e.g. B-vitamin complexes) and herbal preparations (e.g. Moducare™ Plant Sterols) can be utilised to assist immune function (Hindmarch, B., pers. comm.).

Infectious Causes

Respiratory Infection

Young mammals must breathe through their noses when suckling and therefore, a respiratory infection can be life threatening; either causing dehydration and malnutrition or depriving the cub of oxygen and carbon dioxide exchange (Reid and Meier, 1996). Feline Upper Respiratory Disease (FURD) is a highly contagious viral disease, commonly referred to as 'cat flu'. Younger animals often show more marked symptoms including sneezing and nasal discharge, followed by anorexia, depression, fever and signs of nasal and ocular ulceration, hypersalivation and coughing (Reid and Meier, 1996; Simpson, 1996). Secondary bacterial infection causes thick mucopurulent ocular and nasal discharge, loss of olfaction and blocked nasal passages (Simpson, 1996). Diagnosis is based on clinical symptoms but the virus can be isolated from oropharyngeal swabs (Simpson, 1996). Treatment includes isolation and symptomatic relief, although many felines that recover from FURD become carriers of the disease (Simpson, 1996).

Protozoan and Bacterial Infections

All carnivores are susceptible to toxoplasmosis but it appears to be more common in felids (Meier, 1986). Symptoms do not always occur but may include anemia, retinitis, iritis, hepatitis, blindness, central nervous disorders, respiratory distress and diarrhea (Meier, 1986). Cubs with pre-existing conditions or under particular stress (e.g. worm burden, weaning) are most likely to show symptoms. Infection of felines may occur *in utero*, or from the ingestion of oocysts in contaminated feces or eating infected intermediate hosts e.g. mice or infected sheep meat (Meier, 1986). Toxoplasmosis is diagnosed through the presence of oocysts (fertilized cells of the protozoan) in feces and immunological tests. There is currently no satisfactory treatment for toxoplasmosis in felines.

Coccidiosis usually presents as marked diarrhea, particularly in young animals. Infection is often associated with stress and most typical in cubs between one to three months of age (Meier, 1986). Cubs with watery, mucoid or bloody diarrhea, dehydration and/or secondary bacterial infections should be evaluated for coccidiosis (Meier, 1986). Diagnosis is based on the presence of oocysts in the feces and treatment usually involves the use of anti-microbial drugs and re-hydration. Salmonellosis is commonly referred to as "food poisoning" and usually presents as vomiting, diarrhea and anorexia. Infection with *Salmonella* bacteria and toxins produced by such bacteria requires antibacterial drugs and symptomatic relief of dehydration associated with vomiting and diarrhea.

Septicemia may cause lethargy, jaundice (yellowing of the mucous membranes), weight loss, poor nursing, fever, hypothermia, irritability, increased respiratory rate, vomiting, diarrhea, and abdominal distention (Reid and Meier, 1996). Antibiotic therapy should be started immediately and bacterial culture/sensitivity tests are useful in determining the most effective antibiotic regime (Reid and Meier, 1996).

Omphalitis (umbilical infection) was the underlying cause in 1.4% of felid cubs that died at San Diego Zoological Park between 1964 and 1982 (Meier, 1986). Such infections may lead to renal, musculoskeletal and cardiac complications and prognosis for recovery is guarded if there is no rapid response to therapy (Reid and Meier, 1996). Redness, pain, swelling or discharge from the umbilical stump may appear as well as joint swelling and lameness (Reid and Meier, 1996). Local and systemic antibiotics are advised and sanitation must be of the highest standard (Reid and Meier, 1996).

Feline Panleukopenia

This highly infectious virus (a.k.a. feline infectious enteritis, feline distemper and feline parvovirus) has a high rate of infection and mortality, especially amongst young, unvaccinated animals. The disease may cause sudden death, depression, anorexia, persistent vomiting and painful palpation of abdomen (Simpson, 1996). Diarrhea may occur in the later stages and is usually yellow-brown liquid, possibly containing blood (Simpson, 1996). Diagnosis is based on vaccination status combined with clinical signs, hematological tests and detection of the virus in the feces (Simpson, 1996). Currently there is no treatment for the virus so therapy is supportive in nature (i.e. fluid therapy and broad spectrum antibiotics to prevent secondary bacterial infection) (Simpson, 1996).

Feline Infectious Peritonitis (FIP)

The corona virus responsible for this fatal disease is similar to that causing the commonly encountered enteric corona virus (Simpson, 1996). The virus is readily destroyed by most disinfectants and transmission is thought to generally occur through contact with infected feces or urine, rather than direct contact (Simpson, 1996). Early symptoms are often vague but may include fever, anorexia, weight loss and diarrhea. A prolapse of the nictitating membrane is also common, but symptoms soon progress to more specific signs (Simpson, 1996). Some cats are thought to be genetically predisposed to higher sensitivity to this disease than others. There are two forms of the disease and the more common, less severe of cases is termed effusive FIP where fluid accumulates in the abdomen (Simpson, 1996). Non-effusive FIP causes granulomatous lesions on abdominal organs and often

results in organ failure (Simpson, 1996). Half of the cases with non-effusive FIP display central nervous signs and eye lesions may be associated with retinitis and uveitis (Simpson, 1996). The disease is difficult to interpret on serology and biopsy collection and histopathological examination of lesions is currently the only definitive diagnosis (Simpson, 1996). Prognosis is guarded and there is no specific treatment (Simpson, 1996). FIP is a significant cause of mortality in captive cheetahs worldwide.

Growth rates

Knowledge of normal growth curves in mother-reared cubs is critical to determining optimum growth in hand-reared cubs. Departure from normal growth rates may provide an early-warning system for the detection of medical problems in hand-reared cubs (Wack et al, 1991) and only small changes in weight may be significant (Meier, 1986). Recognition of potential medical problems provides the opportunity for earlier intervention, which is likely to decrease cub morbidity and mortality. Rough estimates of growth rates can be made from calculating the adult weight versus the infant weight and time taken to reach maturity (Reid and Meier, 1996). For the cheetah, this works out to be approximately 0.38kg weight gain per week (Average adult male weight taken as 40kg and average birth weight as 0.5kg).

An average growth rate of 40 – 50g/d, reported for hand-reared cubs (Pers. obs., Encke, 1960; Hall, N., pers. comm.; Lombardi et al, 2001) is consistent with the average growth rate observed in six mother-reared litters (21 cubs) at a North American facility (45g/d) (Wack et al 1991) (Fig. 1). Whilst it may appear that no difference exists between mother-reared and hand-raised cubs (CCF, 1998; Lee, 1992) it is important to consider each individual animals' growth rate, rather than simply average growth rates for a litter or one cub over a long period of time.

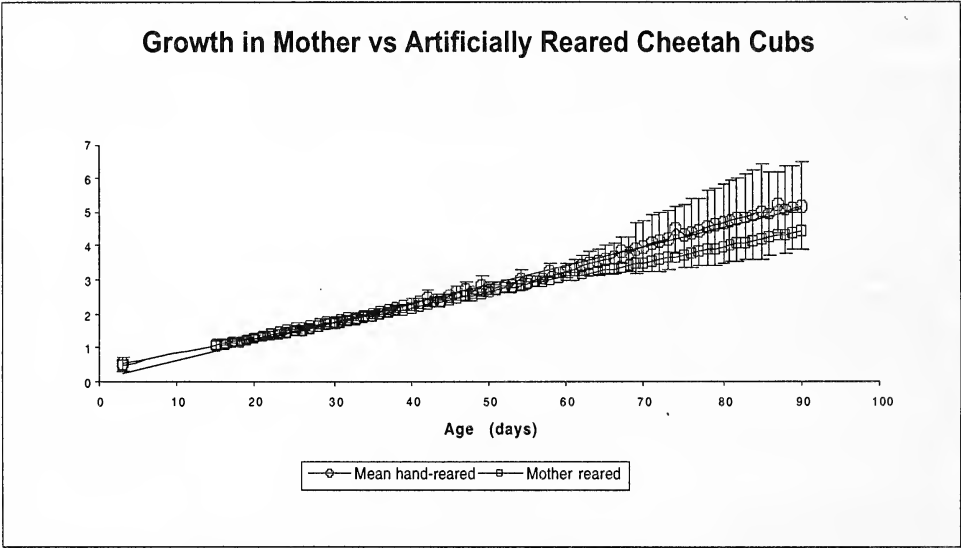


Figure 1. Growth rate of Cheetah Cubs reared artificially compared to mother-reared cubs Hand-rearing data taken from Encke, 1960, Hall, N., pers., comm. (2004), Lombardi et al (2001), Schumann and Schumann (1994), pers. obs. (2004). Mother rearing data taken from Wack et al (1991).

Conclusion

Neonatal cheetahs removed from their mother due to illness or injury are at a weighty disadvantage, in terms of survivability, compared to healthy cubs removed for educational purposes. Even with access to specialist veterinary medicine, many cubs reach zoological nurseries in a severely moribund state, with little hope for survival. In order to reduce infant mortality rates in captive situations, focus must turn to the prevention and/or early detection of morbidity in cubs. Factors predisposing females to abandon, cannibalize or traumatize cubs must be identified and eliminated, or at least minimized. Litters born to females at risk of these behaviors should be considered for hand-rearing, prior to the onset of potentially fatal problems.

Vigilant monitoring of cubs, combined with careful management of the mothers' environment should promote recognition of initial warning signs of impending medical problems. Precipitating earlier intervention is likely to result in more rapid and effective responses than therapy initiated in the later stages of a disease process. Increased cub survival rates and reduced long-term consequences of morbidity during growth and development in cubs should be the priority when rearing cheetah in captivity.

References

Bell K. 2004. Preliminary evaluation of variation in stool consistency between cheetah (*Acinonyx jubatus*) cubs fed either an IamsÆ-containing meat or meat-only diets. Unpublished report for De Wildt Cheetah Research and Breeding Centre, South Africa.

Caldwell P. 2004. Management of Diarrhea in Captive Cheetah (*Acinonyx jubatus*). Proceedings of the South African Veterinary and Paraveterinary Congress 2004

Caro TM, Holt ME, Fitzgibbon CD, Bush, M., Hawkey, CM., Kock, RA. 1987. Health in adult free-living cheetah. Journal of Zoology. 212: 573 – 584

Caro TM. 1994. Female Reproduction and Cub Mortality. In: Cheetahs of the Serengeti Plains. University of Chicago Press, Chicago.

Cheetah Conservation Fund (CCF). 1998. Reproduction, Nutrition, Hand-Rearing and Health. In: Husbandry Manual For the Pan African Association of Zoos, Aquarium and Botanical Gardens (PAAZAB). Ch 4 – 7.

Christie P. 1997 – 1998. Thiamine Deficiency in Cheetah. In: International Studbook: Cheetah (Acinonyx jubatus).

Downes SJT. 1997 – 1998. Copper Deficiency in Cheetah (*Acinonyx jubatus*). In: International Studbook: Cheetah (Acinonyx jubatus).

Encke W. 1960. Birth and rearing of cheetahs at Krefeld Zoo. International Zoo Yearbook. 2: 85 – 86,

Grisham J. 1989. Infant Mortality/Survivability. In: Cheetah SSP Masterplan. American Association of Zoological Parks and Aquariums. Wheeling, West Virginia. Pp 85

Hoff W. 1960. Hand raising baby cats at Lincoln Park Zoo, Chicago. International Zoo Yearbook Pp 86 – 89

Hunter L, Hamman D. 2003. The Cheetah in History. In: Cheetah. Struik Publishers, Cape Town.

Kriek NPJ, Rogers PS, Schultheiss WA, van Vuuren M, Berry WL. 1998. Neonatal mortalities in captive-bred cheetahs. Proceedings of a Symposium on Cheetahs as Game Ranch Animals. Onderstepoort, South Africa. Pp. 114 – 118

Lane E. 2004. Mortality records for cheetah (*Acinonyx jubatus*) in South Africa, 1975 – 2003. Proceedings of the South African Veterinary and Paraveterinary Congress 2004

Laurenson MK. 1994. High Juvenile Mortality in Cheetahs (*Acinonyx jubatus*) and its Consequences for Maternal Care. Journal of Zoology, London. 234: 387 – 408

Laurenson MK, Wielbnowski N, Caro TM. 1995. Extrinsic factors and juvenile mortality in cheetahs. Conservation Biology. 9(5): 1329 – 1331

Lee, AR. 1992. Cheetah (*Acinonyx jubatus*). In: Management Guidelines for the Welfare of Zoo Animals. The Federation of Zoological Gardens of Great Britain and Ireland, London. Pp: 15 – 22

- Lombardi C, Mattupalli S, Fitzgerald K. 2001. The Analysis of Hand-Rearing Data of Cheetah Cubs in the North American Population: The Columbus Zoo and Aquarium Project. Presented at the Global Cheetah Conservation Action Plan Workshop.
- McManamon R. 1993. Practical Tips in Nursery Rearing of Exotic Cats. Journal of Small Exotic Animal Medicine. 2(3): 137 – 140.
- Marker-Kraus L. 1997. History of the cheetah (*Acinonyx jubatus*) in zoos, 1829 – 1994. International Zoo Yearbook 35: 27 – 43
- Meier JE. 1986. Neonatology and Hand Rearing of Carnivores. In: Zoo and Wild Animal Medicine. WB Saunders Company, Philadelphia. 842 – 852.
- Munson L. 1993. Diseases of Captive Cheetahs (*Acinonyx jubatus*): Results of the Cheetah Research Council Pathology Survey, 1989 – 1992. Zoo Biology 12: 105 – 124
- National Research Council. 1986. Nutrient Requirements of Cats. In: Nutrient Requirements of Domestic Animals. National Academy Press, USA.
- O'Brien SJ, Roelke ME, Marker L, Newman A, Winkler CA, Meltzer D, Colly L, Evermann JF, Bush M, Wildt DE. Genetic basis for species vulnerability in the Cheetah. 1985. Science 227: 1428 – 1434.
- Reid BW and Meier, JE. 1996. Neonatal Care Protocols. In: Wild Mammals in Captivity: Principles and Techniques. (Kleiman, D.G., Allen, M.E., Thompson, K.V., Lumpkin, S. Eds.) The University of Chicago Press.
- Ross MH, Romrell LJ, Kaye GI. 1995. Lymphatic tissue, lymphatic organs and the immune system. In: Histology: A text and atlas. Ch. 13: 330 – 369. Williams and Wilkins, Baltimore, USA.
- Schumann M, Schumann, B. 1994 – 1995. Hand raising of Cheetah Cubs. International Studbook Cheetah (*Acinonyx jubatus*). Studbook Keeper: Laurie Marker. NOAHS Centre, National Zoological Park, Washington D.C.
- Simpson, JW. 1996. Medical Disorders and their Nursing. In Veterinary Nursing. Lane, D.R. and Cooper, B. (Eds.) Butterworth-Heinemann.
- Wack RF, Kramer LW, Cupps W, Currie P. Growth Rate of 21 Captive Born, Mother-raised Cheetah Cubs. Zoo Biology 10: 273 – 276.
- Weilenmann, P. 1962. Animal Milk Analyses and Hand-Rearing Techniques: Carnivora. International Zoo Yearbook. 6: 310.



Cheetah Fast Facts

- The cheetah is often mistaken for a leopard. Its distinguishing marks are the long tear-drop shaped lines on each side of the nose from the corner of the eyes to its mouth. These distinctive black "tear stripes" may serve as an antiglare device for daytime hunting.

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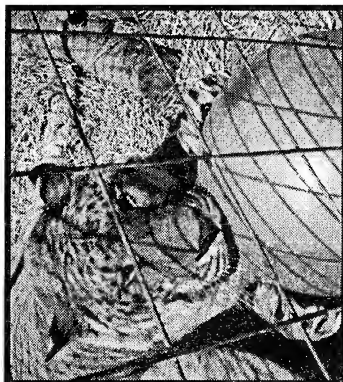
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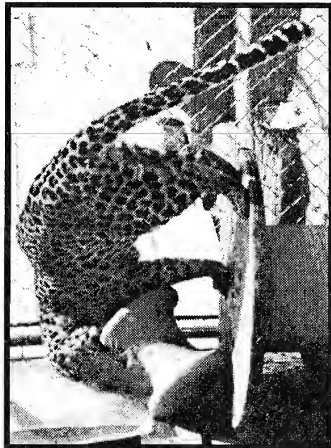
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Hand-rearing Cheetah (*Acinonyx jubatus*) Cubs: Milk Additives

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The maternal milk composition of many wild animals is considerably lower in carbohydrates (lactose) than that found in the domestic counterparts. Milk powders manufactured for domestic animals are generally used as the base ingredient of milk formulas used in zoos and wildlife rehabilitation centers. Many times the milk formula provided contains a higher level of lactose than is found in the maternal milk. Mammals that do not have the lactose enzyme, lactase, have difficulty breaking down the milk sugar for digestion. The undigested particles ferment in the small intestine and allow for the proliferation of potentially pathogenic bacteria. The result is diarrhea and, in severe cases, enteritis (Evans, 1987).

The addition of specific products that either contain lactase or bacteria that produce lactase (e.g. *Lactobacillus*) have been beneficial in assisting the neonate in digesting lactose in the milk formulas. This paper addresses several products available, which may be added to milk formulas, and describes their use and function as they relate to the hand-rearing of captive cheetah cubs.

Milk Additives

Lact-aid® is a product that contains the lactase enzyme. The dose is two drops to 100ml of formula. Lactase will begin breaking down the sugar in the formula and will be effective for 24 hours. Lact-aid® must be added to the formula 24-hours prior to offering it to the cub.

Simethicone is a de-foaming agent that reduces gas build-up in the intestinal tract, a symptom associated with the inability to break down lactose. But this product does not contain lactase, so it doesn't break down the milk sugar. Trade names for simethicone include Gas-X®, Mylicon® (pediatric formula) and Phazyme®.

Lactobacillus spp. is a group of bacteria that produce lactase and digest lactose. It is marketed as "Acidophilus" for humans and Probios® or Bene-bac® for animals. These bacteria live naturally in the gastrointestinal tract of mammals, and help maintain a healthy gut. They also help prevent the proliferation of pathogenic bacteria, such as *E.coli*. (Supplement Watch).

The maternal milk of cheetahs is comparatively low in carbohydrates. As an obligate carnivore, cheetahs obtain their energy source from proteins and fat, not carbohydrates (Bechert, et al., 2002). Diarrhea has been reported in *Panthera* spp. raised on milk formulas high in carbohydrates (Hedberg, 2002). It is a fair assumption that cheetahs also do not digest milk sugars efficiently. Therefore, it would be wise to add one or more products to assist in the breakdown of lactose to prevent gastric upsets, particularly in milk formulas that exceed 3.5% carbohydrates (14.8% DM). Lactaid® is commonly used prophylactically and is readily available. The main drawback of Lactaid® is that it must be added to the milk formula 24 hours in advance of feeding and refrigerated in order to be effective. But when used, it appears to be helpful in preventing the signs associated with lactose-intolerance.

Simethicone may be used to treat a cub with a distended "bloated" abdomen, or added to the formula to prevent the occurrence of a "gassy-stomach". The dose for rabbits with gastrointestinal stasis (ileus) is 67-133mg (1-2ml of pediatric formula) once an hour x 2-3 doses (Krempels, et al., 2000).

The addition of *Lactobacillus* spp. in conjunction with simethicone may be an effective alternative to Lact-aid®, if it is not available. It is unnecessary to add *Lactobacillus* spp. to the milk formula several hours in advance of feeding. The milk is mainly a vehicle for the bacteria to enter the

digestive tract, where it will breakdown lactose into glucose and lactic acid, and the glucose is absorbed into the cells from the small intestine.

Probios[®], a product manufactured for livestock, recommends a dose of 50 million bacteria (5 grams) for newborns of all sizes (lambs and calves). This product does contain vegetable oil (as the binding agent) and sucrose (in very small amounts). If given in too high of dose, it has the potential to loosen the stool, but may be helpful with cubs prone to constipation. The product comes in gel form and packaged in a calibrated syringe. The dose is squirted directly into the mouth of the animal.

Probios[®] is not required every day. The purpose of this product is to ensure there is an adequate population of lactose-consuming bacteria in the gut. They will be self-reproducing, so it is not required that they be completely replenished on a regular basis. A daily dose until the cub is on the full-strength stock milk formula may be advisable, and then every 2-3 days after that until the cub starts consuming solid food. Probios[®] can be discontinued during the weaning process, but given as needed if loose stool/diarrhea occurs.

Bene-bac[®] is a product similar to Probios[®]. It is manufactured by Pet AgTM for birds and small animals. It comes in powder and gel forms. The powder form does not contain vegetable oil and may be added directly to the milk formula during preparation. Like Probios[®], it also contains 10 million bacteria/g. Pet Ag'sTM recommendation is to give it every two days from birth until seven days (or first week of hand-rearing) and then once a week until the introduction of solid foods. The dosing of *Lactobacillus* spp. bacteria is more about infusing an adequate number of bacteria into the gut rather than being weight-related, so the product recommendations should be considered reasonable guidelines — more is not necessarily better.

Acidophilus comes in tablet form and may be crushed and added to the milk formula. The dose for humans (adults and children) is one tablet (1 billion bacteria). From personal experience, I have given small mammals (rodents and rabbits) *acidophilus* at the rate of 1/2 - 1 tablet in a batch of formula which lasts 2-3 days and have had no ill effects from that dose. As a general guideline, one-half tablet/cub/day may be adequate. *Acidophilus* works the same way as Probios[®] and Bene-bac[®]. It is just another form, and does not contain vegetable oil or sucrose.

The addition of products that reduce the effects of lactase in lactose-sensitive or -intolerant species may be a beneficial component of the hand-rearing formula. There are a variety of products, each which have pros and cons attached to them. Each individual facility should consider their particular protocol when deciding which product will provide the most benefit to the animals, and then use it consistently to maximize its effects.

References

- Bechert, U. ; Mortensen, J.; Dierenfeld, E.; Cheeke, P.; Keller, M.; Holick, M.; Chen, T.C.; Rogers, Q. 2002. Diet composition and blood values of captive cheetahs (*Acinonyx jubatus*) fed either supplemented meat or commercial food preparations. *Journal of Zoo and Wildlife Medicine* 33(1):16-28.
- Hedberg, G. 2002. Exotic Felids in Hand-rearing Wild and Domestic Mammals. Gage, L., ed. Iowa State Press, Ames, Iowa. Pp. 207-220.
- Krempels, D.; Cotter, M. Stanzione, G. 2000. Ileus in domestic rabbits. *Exotic DMV* 2(4):19-21.
- Supplementwatch. "Lactobacillus"
www.supplementwatch.com/supatoz/supplement.asp?supplementId=180.

Product List

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*A complete hand-rearing manual is available by request from the author at zoonutrition@msn.com. and will be sent as an electronic document (MS Word).

Cheetah Fast Facts

- The cheetah is the most primitive of all cats, evolving approximately 18 million years ago.
- The name cheetah comes from an Indian (Hindi) word meaning "spotted one." The Swahili word for cheetah is "Duma".
- The cheetah was trained by man for hunting as long as 3000 BC
- Cheetahs were once raced against greyhounds



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Successful Adoption of a Cheetah Litter at Wassenaar Wildlife Breeding Centre

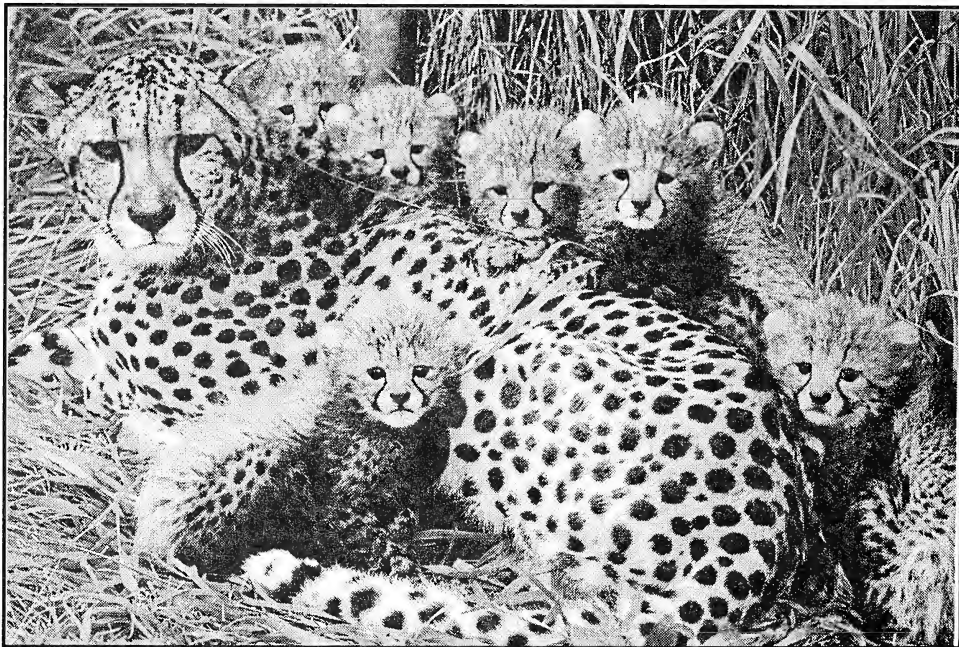
*By Louwman J.W.W. and Louwman J.C.M.
Wassenaar Wildlife Breeding Centre, the Netherlands*

Since 1980 Wassenaar Wildlife Breeding Centre in the Netherlands has been breeding cheetahs regularly and considers this one of its specialities.

In May 1998 an extraordinary event took place in WWBC. In that month three cheetahs in Wassenaar gave birth to a total of ten cubs within two weeks time. Two of the females were first-time mothers.

It is a rule in Wassenaar to weigh all cubs regularly during the first weeks to check health conditions. This can easily be done without causing stress for the mother or cubs. Every day the mother is given access to her outdoor enclosure, while the cubs remain blocked in their den. During these two or three hours the mother gets the chance to eat, defecate and have some exercise, just like in the wild.

All seemed well with the three litters until after two weeks. The cubs of the first litter started to show no weight increase anymore. Although their mother "Arusha" did not seem to be ill, she appeared to have a light fever. This probably caused a reduction of her milk production, resulting in a weight loss of the cubs.



Foster mother "Questa" and three of her own cubs and three adopted cubs at the Wassenaar Wildlife Breeding Centre in the Netherlands. (Photo provided by JanLouwman)

On the third day, after the first signs of weight loss, it became clear that the cubs had to be removed or they would not survive. This meant that the cubs would have to be hand-raised, something which we have always tried to avoid, if possible. This time a possible alternative was considered. We introduced the three young cubs to the only experienced mother, "Questa", who also had three cubs of her own and nearly of the same age (eight days difference). It was a unique opportunity to try this experiment.

While the two mothers were kept busy with a meal in their outside enclosure, the three hungry cubs were removed from their maternity den and placed into the den of "Questa" where they joined the three other cubs. First their coats were rubbed with the new den's layer of sawdust and straw that contained the den's scent. At first all six cubs seemed somewhat upset and made hissing sounds towards each other. It took about half an hour before they all had accepted one another and after a while all fell asleep!

One hour later the risky part of this introduction started. Mother "Questa" was allowed to go back into her maternity den to her offspring and foster young. Amazingly she did not seem surprised by the increased number of cubs. Her attention was obviously focused on the unfamiliar scent. She kept sniffing all parts of the den for about two minutes. Then her interest in the unfamiliar scent gradually faded. An advantage was probably that all the cubs had already adapted the same combination of the scents of each litter, making them all six more or less the same to the mother.

After the second day all the cubs gradually started to increase their weight, and a few days later all had normal weight curves, clearly the mother had no trouble nursing all six young. "Questa" turned out to be a very good foster-mother and her adopted cubs fortunately had no difficulty accepting their new mother. Finally "Questa" reared all young successfully to independence.

Cheetah Rehabilitation and Conservation Research Project

By Carla Conradie, Director

The AfriCat Foundation, Otjiwarongo, Namibia

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AfriCat's aim is to release as many cheetahs and leopards back into the wild as possible. In situations where this cannot happen we endeavor, by means of our Cheetah Rehabilitation Program, to return these animals to an environment that closely resembles the one from which they were initially removed and where they have a second opportunity to live as nature intended.

The AfriCat Cheetah Rehabilitation Program started in November 2000. The philosophy behind this program is to give orphan cheetahs with no previous hunting experience, an opportunity to act on their inherent instincts and perfect their hunting skills, with the potential of relocating them to private game reserves. The cheetahs are radio-collared and released into the 10,000-acre TUSK Trust Cheetah Rehabilitation Area, which contains a variety of game species, such as kudu, oryx, duiker, steenbok, impala, hartebeest, eland, zebra and wildebeest. Their progress and well-being is monitored on a daily basis to establish whether they are hunting successfully and on the road to becoming self-sustaining.

It had been assumed that four carnivores would deplete both the natural and introduced prey base in the area within two years. However, there have been as many as eight leopards and cheetahs known to be in this area at one time and, in spite of the presences of all these carnivores, their hunting didn't appear to be making a significant impact on the game populations. The overall impression has been that the number of antelope in the area has actually increased slightly over the past few years, although the numbers of smaller animals, such as warthog, steenbok and duiker, may have decreased somewhat.

There have been many interesting observations made of the cheetahs' hunting behavior and the size of the prey they have selected and successfully killed within the rehabilitation area. A pair of sibling males was seen to kill an oryx calf out of a herd and three kudu bulls within five days. And zebra calves – all unexpected and difficult feats. This hunting behavior challenges the often-held assumption that cheetahs tend to prey only on small antelope. Studies vary on the number of times cheetahs and other carnivores kill game. Cheetahs in Etosha National Park were observed to catch

once every 2 1/2 days. The cheetahs in the rehabilitation area in some cases appear to kill once every 4 to 5 days while maintaining a healthy condition.

Although the Cheetah Rehabilitation Program is running successfully, the different observations that have been made over the years have indicated that there are many aspects of this initiative that need to be researched and documented.

The primary focus of the planned research project will be to determine the real capacity that a confined 10,000-acre area has in terms of the number of cheetahs that can be rehabilitated within a specific time period, while maintaining a balanced predator/prey ratio. This will involve understanding the process of cheetah rehabilitation, i.e. observing and analyzing the way cheetahs with little or no previous experience learn to hunt successfully. It will also be necessary to ascertain the time period required for these inexperienced cats to hone their hunting skills and become self-sufficient. The size and type of prey species being hunted by the cheetahs and leopards, as well as the frequency of successful hunts, will also be taken into account in order to determine how many carnivores the area can sustain at any one time.

Part of the study will be to establish the long-term success of our Cheetah Rehabilitation Program. The only way to accomplish this will be to continue the monitoring of the cheetahs once they have been relocated and settled into their new environment.

Another aspect of our research will be to establish whether small game parks in Namibia can play a role in the long-term conservation of carnivores. For the purposes of both tourism and hunting, game farming, as opposed to livestock farming, has been increasing in Namibia over the last few decades. Very few of these game farmers are tolerant of the presence of predators, particularly cheetahs, in their game camps because fresh meat is a dietary requirement, i.e. their hunting frequency is perceived to be a great threat to the game population and therefore the farmer's livelihood. As a result, these predators are often shot on sight or trapped and removed from game camps.

There is limited information available to prove a realistic assessment as to the impact the presence of cheetahs in a limited area has on the population numbers of the various game species present in the area. The information gained as a result of this study will be used to assess and/or prove whether the presence of carnivores in a game area is financially viable. The probability that the presence of predators would make game farms more attractive to tourists is also a factor. Accurate statistics and valid information provides for a more convincing argument when trying to persuade game farmers/ reserve owners of the opportunities that the presence of predators can present, together with the benefits/cost of tolerating these animals, as opposed to eliminating them.

This area of research will focus on determining the optimal ratio of carnivores (cheetah and leopard) to prey species population numbers for a small game reserve to be self-sustainable. The financial viability of introducing predators into a small game reserve as a tourism opportunity and asset, as opposed to the losses incurred by the predation of bought game, will also have to be calculated.

The existence of "habituated", radio-collared cheetahs and leopards living in a natural environment, within a confined area of 10,000 acres, provides a unique opportunity to gain insight into the behavior of and interaction between these large carnivores.

To assimilate the data and information required to provide us with conclusive results, our research project will be divided into a number of in-depth studies, which will be conducted over several years.

A controlled environment/study area is essential to obtaining accurate data and information. In order to achieve the ideal surroundings and eliminate any external factors that may influence the results of the studies, there are a number to tasks that need to be carried out within the 10,000-acre TUSK Trust Cheetah Rehabilitation Area.

To ensure that the cheetahs and leopards being studied are confined to the study area and to prevent those animals that do not form part of the study group from gaining access, adjustments and

improvements to the boundary fence are required. The perimeter fence (32km) needs to be completely predator-proof, which will be accomplished by placing a wall of rocks (approximately 300 mm in height and width) along the bottom of either side of the fence. Simultaneously, the bottom strand of electric wire will be raised. Cheetahs and leopards that are not part of the study group will be captured and released beyond the boundaries of the study area.

Annual definitive game counts will be conducted within the study area to obtain accurate numbers of the various prey species that are present, as well as the fluctuation in populations of these animals from year to year. Type, gender, and age distribution of each species will be recorded during the counts.

The first game count took place recently in order to obtain an initial estimate of the population numbers of the various prey species that are present in the area. Over a period of 72 hours, simultaneous counts were conducted from hides placed at six waterholes within the 10,000-acre study area.



This research project is being conducted with the ultimate aim of allowing more cheetahs to be returned to their natural environment and thereby reducing the numbers of those in captivity. The results of the various studies will assist us in achieving this by providing us with information to establish the success of our current Cheetah Rehabilitation Program more accurately. It will enable us to determine whether the input/output of the existing 10,000-acre Cheetah Rehabilitation Area is sufficient to cope with the current or possible future increase in the number of cheetahs that require rehabilitation before being returned to their natural environment. The outcome will establish whether alternative solutions need to be considered and allow us to plan and make provision for these, i.e. to increase the size of the current Cheetah Rehabilitation Area, increase population numbers of prey species, or provide for a second rehabilitation area.

Although work has started on some aspects, we are still trying to secure sufficient funding to enable us to continue with and complete this proposed research project.

Developing a Behavior Modification Program for Your Cheetah

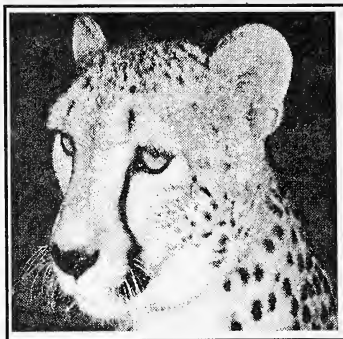
*By Suzanne Merner, Director
Earth, Inc., San Diego, CA
(Exotic Animal Research, Training & Husbandry, Inc.)*

B.F. Skinner wrote, "Teaching, it is often said, is an art, but we have increasing reason to hope that it may eventually become a science." Animal training, plain and simple, is teaching. It is communication between two living organisms, a mutual exchange of information.

The most effective trainers are the ones who can successfully combine the art and science of operant conditioning into a flawless dance. If you have ever seen a truly talented trainer, then you have witnessed this dance, this unspoken language. You have seen first-hand the respect, trust and ease that the trainer and animal are sharing. However, this has been a learning process for both the trainer and the cat.

So where does one start? Like anything else, the more knowledge that you can acquire on a subject the better choices you can make and the more confident you are with those decisions. First, learn all you can about the cheetahs' natural history as well as its individual behavioral history and traits. Having knowledge and understanding of the cheetahs' behavior can give you keen insight for shaping future behaviors. Daily husbandry chores give you excellent opportunities to learn the subtle behavioral cues of your cheetah. Trainers who study and understand the behavior subtleties of their animal charges can usually be very effective with the timing of the bridge. Recognizing the initiation of a behavior can be a very powerful training tool. Some trainers have an innate ability to read a

cheetahs' relaxed and willing demeanor and respond quickly with the bridging stimulus and the reinforcement. These opportunities to bridge the cats' attitude help build the cheetahs' confidence. **An attentive, relaxed carnivore with a great attitude is an easy animal to train!**



01. six-year-old "Sabe"

Second, establish clear goals, short and long-term, develop a training plan. Without a clear training plan, frustration can arise for both the cheetah and the staff. Ask yourself some questions; what will the finished behavior look like? What should the behavior accomplish? How will it be used? Will the behavior facilitate routine maintenance, keeper safety, presentations that can enhance the guest experience, support research projects or medical care, enrichment, physical and mental exercise, decrease stereotypical or undesirable behaviors? Evaluate what the needs are for you and your organizations. Know your limitations and abilities. Whether it is time, money, management support, or the physical and mental limitations and training knowledge of the staff. Do you and your staff have the ability to recognize the skills that it will take to train the behavior?

A beginning trainer should be able to identify, reinforce and maintain the desired behavior. An intermediate trainer is efficient with his or her mechanical skills, such as the use of the bridge, leash, side bucket and hand-feeding. They should also be capable of maintaining the consistency and quality in their training techniques, all of this, while constantly aware of their environment. Advanced trainers are experts in the application of operant conditioning techniques. Trainers at this level should also possess advance skills for mentoring naive animals and staff. They should be confident in their strategies in any challenges they meet.

The bridging stimulus (generally a whistle or clicker) is an excellent tool for shaping behavior. The "bridge" is paired with an appropriate reinforcement and is used to gap the time and distance between the "mark" of the desired behavior and the delivery of the reinforcement. The bridge is a critical component in the operant conditioning process because it gives information to the animal. In essence, the bridge gives the cheetah exact information at that very moment. The animal learns that reinforcement will follow the bridging stimulus. The bridge becomes a primary tool for communication between the trainer and the animal. Operant conditioning is a learning process and the fundamentals build on one another. An animal quickly learns to look to the trainer for positive reinforcement and direction. Once the fundamentals are in place, the bridge can be used to shape future behaviors and in itself will be reinforcing.

To be effective, reinforcement should be positive, immediate and contingent. To be positive the reinforcement must be appropriate and desired. Immediate, the reinforcement must follow the desired behavior. Contingent, the reinforcement must be contingent upon that desired behavior. It should not be given at random. Do not unwittingly reinforce an undesired behavior. The more desired the reinforcement the more positive the reward. If food is the primary reinforcement it should never be an issue with your cheetah. Does the cheetah eat calmly? Is the cat comfortable with you? The cat must be comfortable with your body language and your voice. Read the cats' behavior. The cheetahs' behavior speaks volumes! Constant monitoring of the cheetahs' behavior, the small and subtle cues, allow you to assess their food drive and work them safely. Again, food and the delivery of the food should never be an issue. Safety should always be first for everyone who is involved. After your training plan has been developed, a familiar environment without audio or visual distractions (for you or the cat) is an ideal venue to start your bridge conditioning.

Clear, concise communication should be conveyed on the cheetahs' daily records. Records should reflect type of session, time of session, type and amount of reinforcement, rating of the session, behavioral changes, health and medical issues, and diet totals. These records are extremely important references when there is a behavioral break down. They can help show patterns or cycles in the behavior as well as promote consistency between trainers and sessions. This helps reduce discrimination and facilitates open and clear communication with the staff.

Training is communication that builds a bond of trust and respect with your cheetah. Don't over train and have fun!

A Brief Summary of the Incidence of Renal Amyloidosis in Captive-bred Cheetah (*Acinonyx jubatus*) at the Congo Wildlife Ranch in Oudtshoorn, South Africa

By Dr. Glen Carlisle, Consulting Veterinarian
Congo Wildlife Ranch, Oudtshoorn, South Africa

Introduction

In the time period from December 1987 to February 2005 the Congo Wildlife Ranch in Oudtshoorn, South Africa have lost 67 Cheetah, 28 (41%) of these have been related to or as a direct result of renal amyloidosis.

Renal amyloidosis is a poorly understood phenomenon of the deposition of an insoluble proteinaceous substance (see photos) which infiltrates the medulla (the area between the inner pelvis and outer cortex) of the kidney, becomes waxy and renders the tissue non-functional and the organ begins to fail.

Renal amyloidosis is a common problem found in most captive-bred cheetah populations all over the world, it appears that in the time period (1990-1995) the disease increased in prevalence in the USA and Southern Africa from 20% to 70% where cheetah either died or were euthanased due to acute or chronic renal failure as a result of renal amyloidosis.

Pathophysiology

Cheetahs have a high prevalence of systemic amyloidosis in response to ANY inflammatory condition (gastritis, enteritis, colitis, hepatitis, periprostatic abscess, etc) and renal amyloidosis is an increasingly significant cause of morbidity (illness) and mortality (death) in captive cheetah populations.

Familial forms (affecting members of a closely related group of animals) are also described in Chinese Shar Pei dogs and Abyssinian cats.

Amyloidosis in cheetahs is type AA (i.e. secondary) and involves the renal medullary interstitium, where the amyloid deposits progressively strangulate the blood supply to the renal papilla leading to acute or chronic renal failure. This condition can also be exacerbated by the presence of glomerulosclerosis (progressive damage to the glomeruli which become shrunken, eosinophilic and with a reduction in cell numbers) which is also common in captive cheetah.

Renal amyloidosis is most commonly found secondary to a primary inflammatory condition called **chronic lymphoplasmacytic gastritis**.

Gastritis (inflammation of the lining of the stomach) in captive-bred cheetah is mostly associated with *Helicobacter*-like spiral bacteria in gastric gland cells, however some cheetah show gastritis without spiral bacteria, this may indicate that the pathogenesis of gastritis involves factors other than *Helicobacter* infection.

An autoimmune (disease due to an immune response of one's own cells or antibodies on components of the body) component to the disease is possible, because the inflammatory reaction is predominantly lymphoplasmacytic and orientated toward gastric glands. The same *Helicobacter* is also found in wild cheetah but they show no signs of gastritis.

Clinical symptoms

Clinical symptoms of renal failure include protein loss in the urine, with accompanying weight loss, non-regenerative anemia, uremia, polydipsia (increased drinking) and polyuria (increased urination).

At the Congo Wildlife Ranch we have also seen signs of a stary hair coat, elevated urea and creatinine levels, ataxia, weakness, anorexia, dehydration, vomition and diarrhoea. The disease is prevalent in our older cats from about the age of seven years onwards. Unfortunately by the time we see these signs the renal damage is far advanced and most cats are euthanized.

Diagnosis

Diagnosis of amyloidosis in the kidney is made on histopathology, amyloid deposits are recognised as bright amorphous eosinophilic deposits in the renal medullary interstitium, usually most prominent near the corticomedullary region. (See photos) These deposits are apple green in polarised light, using Congo red stain; and are purple with Masson's Trichome stain.

Treatment

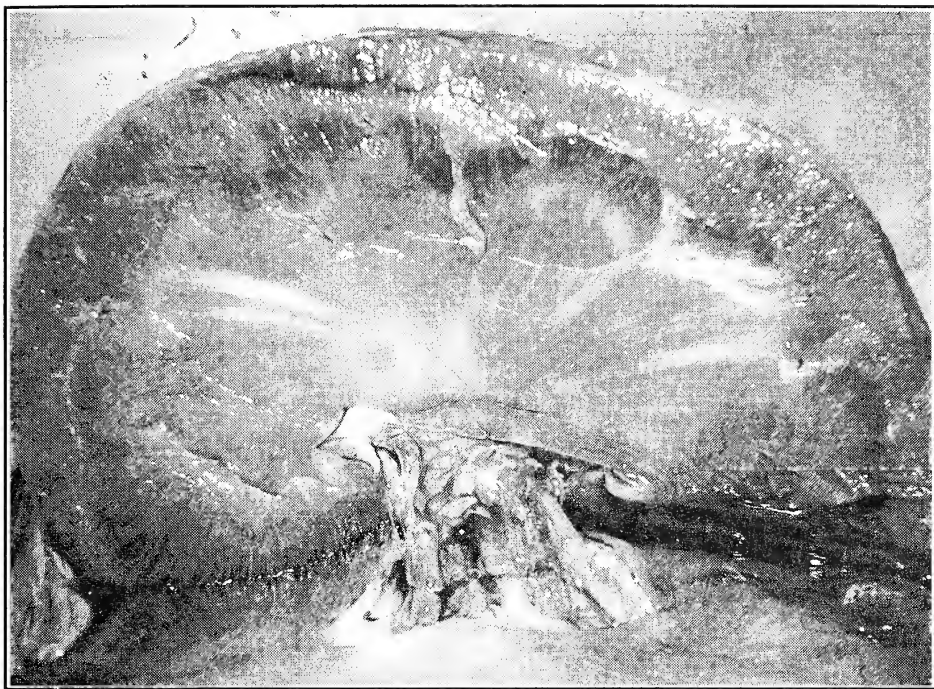
There is no proven successful treatment for amyloidosis, however early identification and treatment of the underlying causes (gastritis being one of the most important) can result in regression of amyloid and associated signs.

The ideal method of diagnosing gastritis is to examine the gastric wall endoscopically as well as take 10-15 gastric biopsy samples at least once annually; these are histopathologically examined for signs of *Helicobacter* and gastritis. The gastroscopy has its own risks associated with the immobilisation of the cheetah and thus is limited to an annual procedure.

Gastritis is being successfully treated at a number of institutions in the USA and South Africa with a number of different regimes; tetracycline hydrochloride 500 mg p.o. qid, metronidazole 250 mg p.o. qid and bismuth subsalicylate 300mg p.o. qid for seven days, thereafter each cheetah is maintained on 300mg bismuth subsalicylate p.o. sid for one yr, also omeprazole, metronidazole and amoxicillin for three weeks has had a dramatically therapeutic effect. A reduction in stress factors as well as aggressive treatment of gastritis seems to be causing a significant reduction in renal amyloidosis.

Management and prevention

1. Continued surveillance to identify, control and treat causes of underlying inflammatory conditions (e.g. gastritis) is recommended †We routinely draw blood and check urea and creatinine values, however the most effective diagnostic tool is gastric biopsy evaluation as discussed previously.
2. When possible, avoid potentially nephrotoxic drugs. (aminoglycosides etc)
3. Endeavour to keep stress to a minimum by:
 - Providing comfortable sleeping quarters.
 - Ensuring individuals in groups get on with each other and that males and females are compatible during the mating season.
 - Providing natural and spacious enclosures away from other feline species who may cause sub-clinical stress.
4. Genetic homogeneity may increase a predisposition to susceptibility to infectious disease or increased propensity for the development of amyloidosis, this should be taken into consideration when matching males and females for breeding.
5. Whether diet plays a role or not has not been established yet but research is currently being done. Diet is unlikely to play a role as captive cheetah worldwide are fed a variety of diets and amyloidosis is prevalent in all groups.



Kidney sagittal section: cheetah. The base of the medulla is pale, waxy and streaks throughout the medulla because of amyloid deposition and fibrosis.

References:

Bolton L.A., Munson L.,
Glomerulosclerosis in Captive
Cheetahs (*Acinonyx jubatus*) Vet
Pathology 36:14-22(1999)

Munson L., Nesbit J.W., Meltzer
D.G.A., Colly L.P., Bolton L., Kriek
N.P.J. Diseases of Captive Cheetahs
(*Acinonyx jubatus jubatus*) in South
Africa: A 20-year retrospective
survey Journal of Zoo and Wildlife
Medicine 30(30): 342-347, 1999

Papendick R.E., Munson L., o Brien
T.D., Johnson K.H. Systemic AA
Amyloidosis in Captive Cheetahs
(*Acinonyx jubatus*) Vet Pathol
34:549-556 (1997)

Wack R.F., Eaton K.A., Kramer
L.W., Treatment of gastritis in
cheetahs (*Acinonyx jubatus*)
Journal Zoo Wildlife Medicine 1997
Sept: 28(3); 260-6



Personal communication with Dr. Emily Lane, (Specialist wild and domestic animal pathologist, Pretoria), Dr. Peter Caldwell (Consultant veterinarian, de Wildt Cheetah Research Centre)

Report from Japan States Amyloidosis Killing Off Cheetahs in Zoos

A research team at Azabu University in Fuchinobe, Japan has issued a report stating cheetahs being raised in troops in Japanese zoos are dying of amyloidosis, a protein abnormality that may be in part stress-related. Amyloidosis is a condition characterized by abnormal protein deposits accumulating in internal organs.

Yumi Une, an assistant professor of veterinary science at the university in Kanagawa Prefecture and the head of the study said the incidence of death among cheetahs appears to be higher for those being raised in bigger groups. She said the team believes the risk of suffering amyloidosis may be increased when cheetahs, which normally live a solitary life in the wild, are exposed to stress from being bred in groups and are also exposed to amyloids included in their excrement.

"Amyloids, which are abnormal proteins, are deposited in the liver, the kidneys or the intestines and cause conditions such as dysfunction," Une said.

Amyloidosis, which can also occur in humans and other animals, is characterized by the deposits of amyloids in organs and tissues such as the kidney or liver, and causes dysfunction in the affected body parts. Such dysfunction in humans may include Alzheimer's disease and Creutzfeldt-Jakob disease.

The Azabu University team analyzed the approximately 180 cheetahs that have died in Japan since 1985 at nine facilities, including zoos and safari parks. Their studies found a correlation between the length of the average life span and the number of cheetahs being bred together. Life spans shortened as group size increased, pointing to the possible effects of stress on the animals. While there was no correlation with respect to the size of breeding area or their feed, amyloid deposition was observed in the kidneys, liver and other organs of 57 of every 60 cheetahs that died, according to the team's study.

The total number of cheetahs being bred in Japan decreased to 50 in 2003 from about 90 in 1995, the team said.

"There are no other animals that have such a high incidence of amyloid deposition," Une said. "I think (the study on cheetahs) will serve as a reference for research on diseases among humans caused by amyloids."

Source: Excerpted from The Japan Times, March 29, 2005

Cheetah Fast Facts

- Litter Size: Up to 8, but usually 2 to 5 cubs
Gestation: 90-95 days
- Life Span: The cheetah can live from 10-15 years in the wild.
- Weight: 75-150 lbs.
- From a standstill, the cheetah can reach its top speed in about three seconds, and can cover almost 33 inches in a single stride.

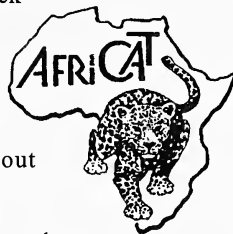
Anthrax Vaccination Evaluation Study in Cheetah

By Peter Turnbull, Arjemptur Technology
reprinted with permission from
AfriCat - Newsletter, Vol. 12, No. 2, 2004

Do scientists and their research usually seem remote and other-worldly to you? The detail in a recent paper in the 3 September 2004 issue of the research journal *Vaccine* on vaccine-induced protection against anthrax in cheetah and black rhino may seem a little hard to follow for the lay reader but, overall, it offers a glimpse into the attempt of a research project to answer practical questions.

It have been recognized for decades that anthrax (that disease now so notorious for its biological warfare and bioterrorism associations) is a common natural seasonal disease among the herbivorous species of the Etosha National Park, occasionally affecting livestock and wildlife in other parts of Namibia. Of particular concern all along has been the additional threat it poses to the already endangered black rhino in Etosha, but it was only very recently realized that cheetah were dying in substantial numbers there from this disease.

Anthrax is not exclusive to Namibia; it similarly affects wildlife and livestock in most other sub-Saharan countries of Africa. In livestock it is controlled by vaccination with a live vaccine. In wildlife, though, it is seen as part of the natural ecosystem and, for most wildlife situations, vaccination is generally impractical or counter to policies of hands-off management, except when it starts to threaten a particular at-risk population severely. Under those auspices, vaccination of Etosha black rhino has been carried out periodically since the 1970s.



As another endangered species, cheetah also qualify for intervention against anthrax. However, with their peculiar genetic monomorphism (meaning that, unlike any other mammalian species, there are very few animal-to-animal gene differences), questions arose about what reaction these animals might have to a live vaccine and what would be their ability to mount and immune response following vaccination.

Historically the value of animal vaccines such as the livestock anthrax vaccine has been tested by vaccinating a set of animals and then infecting both the vaccinated group and an unvaccinated "control" group with the disease agent, comparing the outcome. Clearly a challenge study of this type could not be done in the case of cheetah, so the approach in this study was to vaccinate cheetah and collect blood samples from the vaccinated animals at several time points afterwards; and then to inject the serum (the fluid remaining when the blood cells have been removed) into mice, which were then tested for protection against infection. The theory behind the tests is that, if cheetah sera protected the mice, then the cheetah themselves had protective immunity against the disease. It is hard to prove this absolutely, but it is reasonably logical. Antibody tests were also done on the cheetah sera in an attempt to see if measurable antibodies were a reliable indicator of protection, thereby providing a way to determine if cheetah were protected without needing to use mice.

In all, 12 of the AfriCat cheetahs were enrolled in this study. No adverse reactions to the vaccine or ill effects were observed, and their immune response proved to be what would be considered normal for any other animal. From the results it was possible to offer the advice to wildlife management that, in situations where the cheetah were at a high risk of exposure to anthrax, two vaccinations, two or more months apart, would result in the best chance of protection.

The black rhino was not forgotten either. It was possible to assure the vets in Etosha using dart guns to administer the vaccine from a distance, that the darts were indeed delivering the vaccine and inducing protective immunity against anthrax in these precious animals.

Cheetah Conservation in Namibia

*By Laurie Marker, PhD.
Founder/Executive Director
Cheetah Conservation Fund*

In Namibia, cheetahs have long been persecuted due to conflict with local farmers, and the population has suffered high levels of “off take” as a result, with 6,829 wild cheetahs reported killed or placed in captivity during the 1980s alone (CITES, 1992; Marker-Kraus *et al.*, 1996). Understanding the human/predator conflict problems within the South African system is rather complex, however, identifying and implementing effective conflict resolution strategies are key elements to the cheetah’s future in this country. The need to conserve the cheetah does not come into the mind of most southern African farmers who have lost livestock or game through cheetah predation. The farmer’s interests are in economic gain, be it through the sale of livestock, or selling game as trophies to foreign hunters. The key question to answer here is can the economic needs of the people be provided for, while at the same time the biological and ecological requirements of the cheetah be met?

Therefore, opportunities for southern African farmers to benefit from the land without compromising the survival of the cheetah must be developed. For successful conservation, cheetahs require large areas of intact habitat encompassing suitable and available prey, and there must be mechanisms that allow movement of cheetahs between regions to encourage gene flow. Land available for cheetahs in South Africa has become fragmented by the extensive development of game-fenced farms, where most of the game is “used” for trophy hunting and the presence of a predator, like the cheetah is not tolerated. Outside of the game-fenced farms are cattle farms and therefore the cheetahs are in conflict with the farmers and their livestock.

Research from my recent PhD. thesis has shown that cheetahs and farmers can co-exist if suitable strategies are employed. The objectives of cheetah conservation must be to encourage practices that tolerate predators through restored habitat and healthy management of wild game populations, via a reduction in both game fencing and the stocking of non-native game species, as well as through the establishment of conservancies.

Strategies for cheetah survival on southern African farmlands must include two important aspects, education and economic development. A multi-disciplined and integrated approach to educate the human population and alleviate poverty is necessary and this may be done through training and creating entrepreneurship opportunities. This does not mean financially paying farmers for cheetahs to remove them from their lands.

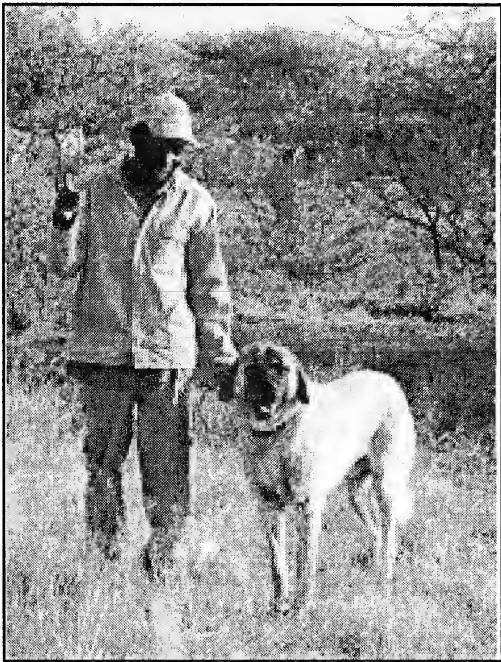
Protecting livestock and farmed game from depredation was the primary reason for cheetah removals reported to CCF, accounting for 91.2% of live cheetah captures ($n = 343$) and 47.6% ($n = 30$) of cheetah killings between 1991 and 1999 (Marker *et al.*, 2003a). Cheetah removals were often performed as a preventative measure, rather than in response to actual depredation events, with 59% of farmers removing cheetahs even though they did not consider them problematic (Marker *et al.*, 2003c). Analysis of scat from wild cheetahs on the farmlands indicated that they preferentially selected native game species over either livestock or exotic game (Marker *et al.*, 2003d), suggesting that they were less of an economic threat to farmers than was commonly perceived. However, such research is unlikely to change deeply ingrained perceptions, and it is important to work with local communities to reduce the level of economic losses that are sustained, which are commonly attributed to depredation events by carnivores.

A baseline survey to determine local attitudes towards large carnivores revealed that 64% of Namibian farmers surveyed removed cheetahs from their land, usually to prevent depredation, and more than 60% used no form of livestock management (Marker *et al.*, 2003c). Failure to use these basic

techniques, such as calving camps to protect vulnerable animals, synchronising calving seasons, using herders and/or guarding animals, bringing in all smallstock at night, and keeping adequate records of the stock, is likely to result in livestock losses that are usually blamed on predators, although other factors such as theft, stillbirths and accidental deaths are likely to play significant roles (Rabinowitz, 1986; Quigley and Crawshaw, 1992; Schumann, 2003)

Encouraging farmers to utilize more effective livestock management techniques can have significant impacts in terms of reducing losses: in Namibia, 76% of farmers who received an Anatolian Shepherd livestock guarding dog reported large declines in the level of livestock loss suffered (Marker *et al.*, submitted-a). We found that using guarding animals was very successful, as the dogs effectively guarded smallstock herds against both predators and theft, and also alerted herders to stock that had been left in the bush. Livestock guarding dogs were placed primarily with smallstock, while female donkeys with foals, kept amongst cattle, were found to effectively guard the herd of cattle from predators (Marker-Kraus *et al.*, 1996; Schumann, 2002). Reducing levels of livestock loss in this way lessens the economic pressures on farmers, and reduce the incentives for removing predators from private land (Marker-Kraus *et al.*, 1996; Schumann, 2003).

Predation upon livestock is often aberrant behavior for carnivores (Rabinowitz, 1986) and the majority of cheetahs that were found killing livestock during our study had physical problems that were likely to hamper their hunting efficiency (Marker *et al.*, 2003b). However, predation upon game is a more difficult issue, as it involves normal hunting behavior, and conserving large carnivores involves maintaining a suitable prey-base that they can exploit without creating intense conflict. Farmers should be encouraged not to stock exotic game species, as they are expensive, ill-adapted to cope with local conditions and suffer heavily from depredation (Marker and Schumann, 1998). The commercial farmlands in Namibia support good populations of free-ranging, native ungulates, and through the formation of conservancies, where multiple farms are managed co-operatively on a sustainable basis, the entire conservancy can sustain populations of large carnivores, as the resultant depredation does not severely affect individual farmers but is absorbed across the conservancy as a whole.



Anatolian Shepherd Guard Dog
(Photo courtesy of CCF)

Our data in Namibia showed that the perceived threat to livestock or game from cheetahs was much greater than the actual threat they posed. From our limited research in South Africa, this appears to be similar. Furthermore, there was no relationship between the percentages of livestock owned, livestock losses and cheetah problems and removals. The data suggested that there might be some 'threshold' level of loss, e.g. 15 or 20 animals per year to any cause, above which the farmer finds the situation unacceptable, regardless of the size of his herd overall, or reason for the loss. Changing the perception that cheetahs are a significant threat to livestock and game is clearly of vital importance if indiscriminate removal is to be reduced. An indication that the levels of tolerance towards cheetahs can be increased through awareness-building and education was shown by the increased proportion of tagged and radio-collared cheetahs Namibian farmers allowed to be released during our research. Most of the releases were facilitated through long-term contact and work with farmers and indicate

that extension-training programs have positive effects and that continuing such programs, and expanding them, is beneficial.



Problem cheetah are sometimes trapped and removed from farmlands where they present a threat to livestock. (*Photo courtesy of CCF*)

We believe that education in sustainable land use must be encouraged, with the primary goal of showing how the linkage of these practices provide direct and indirect benefits to communities. Programs should be developed that train land managers in the environmental value of appropriate range management and which optimizes the economic value of a sustainable, mixed wildlife-livestock system designed to avoid land degradation. Such programs should focus on the benefits of natural resource management, attaching economic and cultural values to these resources, and raising awareness of ecological issues. Successful examples of local conservancies and trans-boundary land management planning are providing a basis for developing large-scale land management plans for the future.

Education regarding predator ecology, behavior, population status, the role of large carnivores and more efficient game and livestock management techniques are all key components of any program aimed at resolving conflict with local people. Misconceptions abound in these areas, with uncertainty regarding species identification, ecology, behavior, how to determine the cause of stock losses, and the level of threat posed by wild carnivores. To address these issues in Namibia, a comprehensive education program has been one of the central tenets of CCF's operation since its inception, with the aim of making the research results available and relevant to the local communities. Over the past 13 years, Namibian education staff have worked with over 130,000 students, encouraging an awareness of ecology and conservation issues, and have developed a wide range of educational materials for teachers to use in local schools. Many learners, from primary schoolchildren to university students, have also visited the field research centre, where they are taught about all aspects of cheetah biology, ecology and research projects being conducted, both locally and internationally.

Additional courses and training schemes, such as workshops on livestock management, environmental education, and ecology have been implemented with the aim of local capacity-building and empowerment, and internships are provided to assist students in developing marketable skills and completing degrees. Working with local people in a variety of ways, supporting local development, highlighting the potential value of predators on private land and furthering the understanding of

ecosystem management is key to changing negative attitudes towards wildlife, and ultimately reducing the level of conflict (Marker, 2003).

The availability of a wild prey base for the cheetah is critical in the issue of predator conflict in southern Africa. According to many Namibian farmers, maintaining a substantial population of wild game is the most important feature in reducing livestock predation. Therefore mixed farms with both livestock and wildlife should be encouraged. The relationship between prey availability, livestock predation and feeding behavior in cheetahs has important management implications. Our data indicated that cheetahs preferentially take wild game species over domestic livestock. Although domestic stock were evident in 6.4% of the scats, confirming that cheetahs do prey upon livestock, two-thirds of the available prey base on Namibian farmlands is livestock, suggesting that cheetahs appear to preferentially select game species. Farmers' reported information supports this finding.

One of the biggest arguments against allowing cheetahs on game farms is the risk of them preying upon expensive, exotic game animals. Many game farmer's stock exotic game species on their land for trophy hunters, and these animals are not only more valuable than indigenous game but may also be more liable to predation than the better-adapted indigenous species. Although results presented from scat analysis suggest that cheetahs prey mainly upon indigenous game species, even a relatively low level of predation upon expensive, introduced game can have economic impacts upon farmers that they are unwilling to tolerate. Therefore, strategies to mitigate such economic losses could include fencing sections of farms that contain expensive game animals. These initiatives should be a part of a game farm management plan and linked to permitting regulations as a part of government policy, as most game-fenced areas are not conservation areas but are private businesses. Proposed game laws in Namibia will stipulate that game-fenced areas cannot eliminate wildlife indiscriminately for private gain. Therefore, government policies can be important.

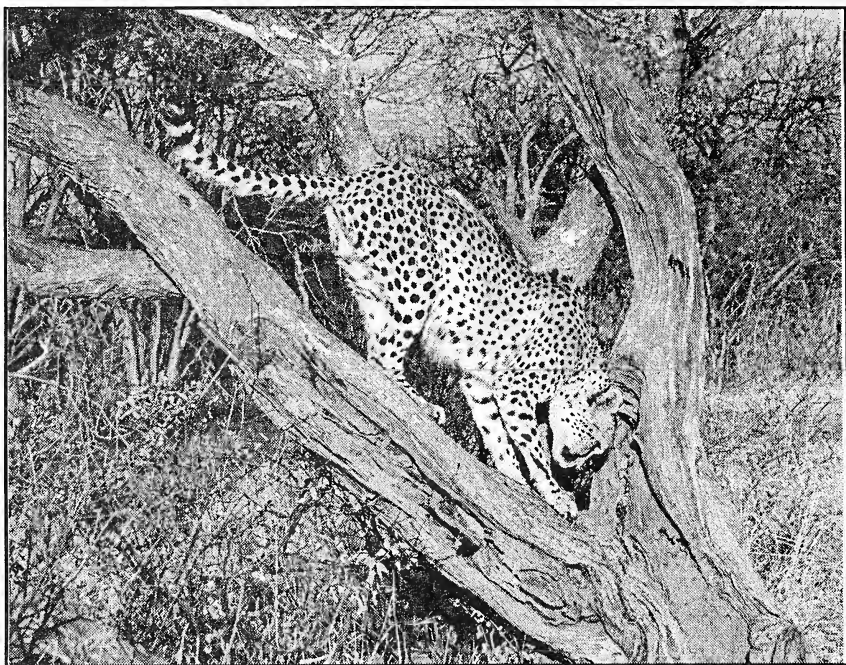
A longer-term, more sustainable strategy than fencing in small portions of land for game, might be the removal of game fencing and, instead, the development of cooperative game management areas in the form of conservancies. Conservancies consist of adjacent farms that are joined together in broad units where natural resources are cooperatively managed using ecosystem-sensitive management plans. A constitution outlines conservation and management strategies, including the sustainable utilization of natural resources in conjunction with agricultural aims. Conservancy constitutions may include utilization of game for trophy hunting, meat, ecotourism, etc., and provide guidelines to assist farmers in coordinating the management and utilisation of species on the farms.

For instance in Namibia, proposed wildlife laws will provide incentives to farmers cooperating in conservancies to encourage large unfenced areas that will promote movement of game species, especially during droughts. Objectives for conservancy development should also include the connectivity of conservancies throughout the country therefore providing corridors for movement of wildlife (game and cheetahs) to ensure gene flow. Strategies such as these, whereby the sustainable utilization of natural resources is encouraged, will be critical components of cheetah conservation outside protected areas.

To reduce the levels of conflict between people and cheetahs, there must be some economic advantages to maintaining cheetahs on private land. Potential economic benefits include, trophy hunting, incentives for predator-friendly meat, and ecotourism.

However, large carnivores are often elusive and hard to observe, particularly outside of protected areas, so the chances of tourists actually viewing predators directly may be limited in many places, including Namibia. Despite this, we have found that showing visitors even indirect signs of carnivore presence can be a significant attraction: in Namibia, the occurrence of 'playtrees' (specific trees used by cheetahs for scent-marking) on farms provides an ecotourism opportunity for visitors, as they often show signs of cheetahs, which increases the awareness both of the presence and ecology of this rare species. Encouraging such ecological awareness amongst tourists is an important

component of predator conservation, both in Namibia and in other countries such as Kenya, where the tourist pressure on cheetahs and other carnivores is very intense (Burney, 1980; Wykstra-Ross and Marker, 2001).



Cheetah in a “playtree” used for scent-marking. (*Photo courtesy of CCF*)

Tourism, however, can be a fickle industry, and even isolated incidents of unrest or violence in a country can have substantial impacts on the numbers of tourists willing to visit an area, which can be devastating for local communities reliant upon tourists for their income (Infield and Adams, 1999; Sillero-Zubiri and Laurenson, 2001). For long-term success, several methods of generating revenue from wildlife should be combined to provide communities with a stable income, for instance by offering opportunities for both ecotourism-based safaris and trophy hunting.

Trophy hunting can play an important role in the conservation of large carnivores outside protected areas, with the intention that by giving predators enough potential monetary value, people are deterred from removing them indiscriminately (Child, 1996; Sillero-Zubiri and Laurenson, 2001). Revenue from trophy hunting can be substantial for local people, as hunters tend to spend more time and money in an area than other tourists (Edwards and Allen, 1992; Sillero-Zubiri and Laurenson, 2001). Namibia currently has a CITES export quota for 150 cheetahs, although the numbers of cheetahs reportedly killed for trophies has never reached the quota limit (Marker and Schumann, 1998). Trophy hunting accounted for only 11% of the wild cheetah deaths reported to CCF (Marker *et al.*, 2003a), and at its current level seems unlikely to have any significant effect on population viability.

However, almost a third of the trophy-hunted cheetahs reported to us were females, and if the same ratio occurs nationwide, such removals could be of greater concern. While efforts have been made with certain species to teach hunters how to distinguish between the sexes, with the aim of targeting males (Smith, 1995), the similarity between the sexes, limited visibility in densely bushed habitat and the rarity of encountering a cheetah on a hunt make this approach unlikely to succeed on the Namibian farmlands. Moreover, the potential revenues from trophy hunting presently seem to have little effect in terms of reducing indiscriminate removals, which still dwarf the number of cheetahs

killed for trophies (Marker *et al.*, 2003a). This is due to several factors, including the difficulty of finding a cheetah out on the farmlands without resorting to unethical, 'canned' hunts, and the relatively low trophy fee currently charged for cheetahs, which in 2000 was only US \$2000 (M.E.T., 1999). Raising the trophy fee substantially would make investing in trophy hunting far more beneficial for the landowners involved. Ideally, trophy hunting permits should be awarded to an entire conservancy, rather than to individual farmers, creating incentives for conservation across a large area.

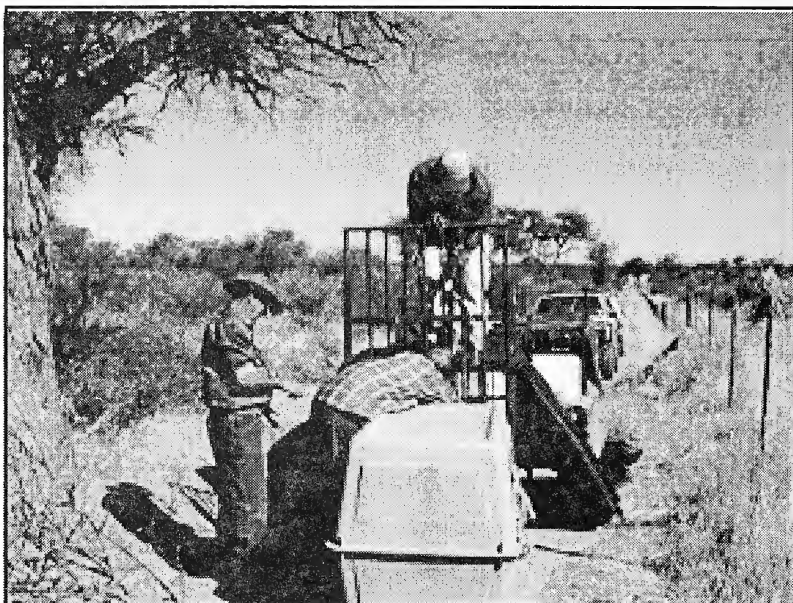
Marketplace pressures can also have strong impacts in terms of driving conservation and raising public awareness of issues, as was seen with the highly successful marketing of 'dolphin-friendly' tuna, and such initiatives can also be utilized for carnivore conservation. Despite the reduction in cheetah removals by Namibian farmers over the years and an increased tolerance towards them, this trend could easily be reversed if economic conditions worsened in Namibia, as farmers would be less likely to tolerate any losses due to carnivores (Marker, 2003). To avert this situation, economic incentives should be provided to farmers who practice ecologically-sound livestock management, such as avoiding lethal predator control, joining conservancies, limiting stocking rates and restoring habitat. With this aim, CCF is currently collaborating with the Namibian meat production company, MeatCo, to investigate the viability of selling beef at a premium from farmers who use 'predator-friendly' techniques, providing direct economic incentives for farmers, and raising international public awareness.

As tourism is increasingly important in southern Africa, another beneficial development is the new certification in South Africa of 'cheetah-friendly' guest farms, which do not remove predators from their land, and this too could provide tangible benefits to conserving carnivores on private land. These initiatives ensure that landowners benefit directly from tolerating predators, circumventing the common problem of conservation revenues failing to reach local people (Martin, 1986; Hackel, 1999).

As human land-use has the greatest impact on the distribution and abundance of cheetahs, monitoring several parameters, including population fragmentation, health, and habitat loss will be necessary so as to not miss important elements which may affect species survival. Although maintaining cheetahs in protected areas will provide long-term habitat stability and, as such, are critical areas for the cheetah, conflict resolution between people and cheetahs will be a significant determinant for cheetahs in the future on private lands. As such, management of 'problem' animals will continue and necessary strategies must be implemented. Such strategies may include placing individuals in captivity, translocating animals, or re-introduction; each provides opportunities for species conservation but should be conducted under international guidelines. Overall, through collaborative research and multi-disciplined approaches, both within protected areas and on private lands, it should be possible to maintain large intact ecosystems for the cheetah, which is the most critical aspect of future conservation, both for cheetahs and for other large carnivores.

Conclusions

Protected areas provide important refuges for numerous species, but the successful conservation of many large carnivores depends on conserving them beyond the boundaries of such areas as well. The most critical component of successful conservation outside protected areas involves working with local communities to achieve sustainable human-wildlife coexistence, particularly when the species under consideration are large carnivores (Phillips *et al.*, 1995; Weber and Rabinowitz, 1996; Sillero-Zubiri and Laurenson, 2001). Conservation initiatives on private land must combine a myriad of interrelated, community-based approaches, including habitat and prey-base conservation or restoration, education about predators, conflict resolution, and financial incentives. Educating local people about predators is critical to conservation, as there is often a lack of awareness that locally abundant species may be globally threatened, and local concerns must be recognised and addressed for any significant progress to be made (Sillero-Zubiri and Laurenson, 2001).



A cheetah is crated for relocation by CCF staff and volunteers. (Photo courtesy of CCF)

Employing this approach on the Namibian farmlands has proved successful in terms of reducing conflict and diminishing removals, with farmers showing increased tolerance of cheetahs, and annual removal rates falling significantly, from a mean of 19 cheetahs per farmer per year in 1991 to 2.1 by 1999 (Marker *et al.*, 2003c). Conflicts still occur on the farmlands, and removals still take place, but this example shows that attitudes towards predators can be positively influenced by long-term conservation efforts. Highlighting the value of such work on private land does not diminish the importance of protected areas, but rather emphasizes the potential of employing approaches that transcend such boundaries for the effective conservation of large carnivores. Overall, through collaborative research and multi-disciplined approaches, both within and outside protected areas, it should be possible to maintain large tracts of habitat where large carnivores can be not only be tolerated, but also provide tangible benefits to local people. Achieving this goal will be the most critical step in attaining the long-term conservation of viable predator populations, not for just cheetahs in Namibia, but for any population of large carnivores wherever they occur.

Literature Cited

- Bauer, G.A. (1998) Cheetah - running blind. Proceedings of a Symposium on Cheetahs as Game Ranch Animals, pp. 106-108.
- Bester, B. (1996) Bush encroachment: A thorny problem. *Namibia Environment*, 1, 175-177.
- Breitenmoser, U., Breitenmoser-Würsten, C., Carbyn, L.N. & Funk, S.M. (2001) Assessment of carnivore reintroductions. In *Carnivore conservation* (eds J.L. Gittleman, S.M. Funk, D.W. Macdonald & R.K. Wayne). Cambridge University Press, Cambridge, U. K.
- Burney, D.A. (1980) The effects of human activities on cheetah (*Acinonyx jubatus*) in the Mara region of Kenya, University of Nairobi, Nairobi.
- Child, B. (1996) The practice and principles of community-based wildlife management in Zimbabwe: The CAMPFIRE programme. *Biodiversity and Conservation*, 5, 369-398.
- CITES (1992) Quotas for trade in specimens of cheetah. Eighth meeting of the Convention of International Trade in Endangered Species of Wild Fauna and Flora, pp. 1-5.
- Clark, T.W., Mattson, D.J., Reading, R.P. & Miller, B.J. (2001) Interdisciplinary problem solving in carnivore conservation: An introduction. In *Carnivore conservation* (eds J.L. Gittleman, S.M. Funk, D. Macdonald & R.K. Wayne): pp. 223-240. Cambridge University Press, Cambridge.
- Crawshaw, J., P. G. & Quigley, H.B. (1991) Jaguar spacing, activity and habitat use in a seasonally flooded environment in Brazil. *Journal of Zoology*, 223, 357-370.
- Edwards, S.R. & Allen, C.M. (1992) Sport hunting as a sustainable use of wildlife., IUCN Sustainable Use of Wildlife Programme. IUCN., Washington, D.C.

- Ferreras, P., Aldama, J.J., Beltran, J.F. & Delibes, M. (1992) Rates and causes of mortality in a fragmented population of Iberian lynx *Felis pardina* Temminck, 1824. *Biological Conservation*, 61, 197-202.
- Frank, L.G. & Woodroffe, R. (2001) Behaviour of carnivores in exploited and controlled populations. In *Carnivore conservation* (eds J.L. Gittleman, R.K. Wayne, D.W. Macdonald & S.M. Funk). Cambridge University Press, Cambridge.
- Gilpin, M.E. & Soule, M.E. (1986) Minimum viable populations: Processes of species extinctions. In *Conservation biology: The science of scarcity and diversity* (ed M.E. Soule). Sinauer Associates, Inc., Sunderland, Massachusetts.
- Ginsberg, J.R., Alexander, K.A., Creel, S., Kat, P.W., McNutt, J.W. & Mills, M.G.L. (1995) Handling and survivorship of African wild dog (*Lycaon pictus*) in five ecosystems. *Conservation Biology*, 9, 665-674.
- Hackel, J.D. (1999) Community conservation and the future of African wildlife. *Conservation Biology*, 13, 726-734.
- Hilton-Taylor, C. (2000) IUCN red list of threatened species, pp. 61, IUCN, Gland, Switzerland and Cambridge, U. K.
- Hunter, L.T.B. (1998) The behavioural ecology of reintroduced lions and cheetahs in the Phinda resource reserve, Kwazulu-Natal, South Africa, University of Pretoria, Pretoria, South Africa.
- Infield, M. & Adams, W.M. (1999) Institutional sustainability and community conservation: A case study from Uganda. *Journal of International Development*, 11, 305-315.
- Johnson, W.E., Eizirik, E. & Lento, G.M. (2001) The control, exploitation and conservation of carnivores. In *Carnivore conservation* (eds J.L. Gittleman, S.M. Funk, D.W. Macdonald & R.K. Wayne): pp. 196-219. Cambridge University Press, Cambridge, U. K.
- Kellert, S.R., Black, M., Rush, C.R. & Bath, A.J. (1996) Human culture and large carnivore conservation in North America. *Conservation Biology*, 10, 977-990.
- Kerley, L.L., Goodrich, J.M., Miquelle, D.G., Smirnov, E.N., Quigley, H.B. & Hornocker, M.G. (2002) Effects of roads and human disturbance on Amur tigers. *Conservation Biology*, 16, 97-108.
- Lambrechts, A.V.W. (1995) Meeting wildlife and human needs by establishing collaborative nature reserves: The Transvaal system. In *Integrating people and wildlife for a sustainable future* (eds J.A. Bissonette & P.R. Krausmann): pp. 37-43. The Wildlife Society, Bethesda.
- Lindsay, W.K. (1987) Integrating parks and pastoralists: Some lessons from Amboseli. In *Conservation in Africa: People, politics and practice* (eds D. Anderson & R. Grove): pp. 149-168. Cambridge University Press, Cambridge.
- Marker, L. (2003) Aspects of cheetah (*Acinonyx jubatus*) biology, ecology and conservation strategies on Namibian farmlands, pp. 476 *Department of Zoology*, University of Oxford, Oxford, U.K.
- Marker, L. & Schumann, B.D. (1998) Cheetahs as problem animals: Management of cheetahs on private land in Namibia. Symposium on Cheetahs as Game Ranch Animals, pp. 90-99.
- Marker, L.L., Dickman, A.J., Coppinger, R. & Macdonald, D.W. (submitted-a) Evaluating the effectiveness of livestock guarding dogs as a method of conflict resolution. *Journal of Rangeland Management*.
- Marker, L.L., Dickman, A.J., Jeo, R.M., Mills, M.G.L. & Macdonald, D.W. (2003a) Demography of the Namibian cheetah (*Acinonyx jubatus jubatus*). *Biological Conservation*, 114, 413-425.
- Marker, L.L., Dickman, A.J., Mills, M.G.L. & Macdonald, D.W. (2003b) Aspects of the management of cheetahs, *Acinonyx jubatus jubatus*, trapped on Namibian farmlands. *Biological Conservation*, 114, 401-412.
- Marker, L.L., Mills, M.G.L., Jeo, R.M., Dickman, A.J. & Macdonald, D.W. (submitted-b) Factors influencing the spatial distribution of cheetahs (*Acinonyx jubatus*) on north-central Namibian farmlands. *Journal of Applied Ecology*.
- Marker, L.L., Mills, M.G.L. & Macdonald, D.W. (2003c) Factors influencing perceptions and tolerance toward cheetahs (*Acinonyx jubatus*) on Namibian farmlands. *Conservation Biology*, 17, 1-9.
- Marker, L.L., Muntifering, J.R., Dickman, A.J., Mills, M.G.L. & Macdonald, D.W. (2003d) Quantifying prey preferences of free-ranging Namibian cheetahs. *South African Journal of Wildlife Research*, 33, 43-53.
- Marker-Kraus, L., Kraus, D., Barnett, D. & Hurlbut, S. (1996) *Cheetah survival on Namibian farmlands*. Cheetah Conservation Fund. Windhoek.
- Martin, R.B. (1986) Wildlife utilisation. In *Conservation and management in Africa* (eds R.H.V. Bell & E. McShane-Caluzi): pp. 219-232.
- M.E.T. (1999) Ministry of environment and tourism: Quick facts., Windhoek.
- McCarthy, T. & Allen, P. (1999) Knitting for snow leopards. *Cat News*, 30, 24-25.
- Michler, I. (2002) To snap or snipe?, pp. 31-35 *Africa Geographic*.
- Muroua, N.D., Marker, L., Nghikembua, M. & Jeo, R.M. (submitted) Bush encroachment and ungulate density on commercial farmlands in north-central Namibia.
- Noss, R.F., O'Connell, M.A. & Murphy, D.D. (1997) *The science of conservation planning*. Island Press. Washington, DC.

- Nowell, K. & Jackson, P. (1996) *Wild cats: Status survey and conservation action plan*. Burlington Press. Cambridge.
- Phillips, M.K., Smith, R., Henry, V.G. & Lucash, C. (1995) Red wolf reintroduction program. In *Ecology and conservation of wolves in a changing world* (eds L.N. Carbyn, S.H. Fritts & D.R. Seip): pp. 157-168. Canadian Circumpolar Institute, Edmonton.
- Quigley, H.B. & Crawshaw, P.G. (1992) A conservation plan for the jaguar *Panthera onca* in the Pantanal region of Brazil. *Biology of Conservation*, 61, 149-157.
- Rabinowitz, A. (1986) *Jaguar: Struggle and triumph in the jungles of Belize*. Arbor House, New York.
- Rudnai, J. (1979) Ecology of lions in Nairobi National Park and the adjoining Kitengela conservation unit in Kenya. *African Journal of Ecology*, 17, 85-95.
- Schneider, H.P. (1994) *Animal health and veterinary medicine in Namibia*. AGRIVET. Windhoek, Namibia.
- Schumann, M. (2002) Dangerous donkeys. *Cheetah Conservation Fund newsletter*, 17, 4.
- Schumann, M. (2003) Guide to integrated livestock and predator management: CCF RISE Namibia communal conservancy shepherd training course proceedings, Cheetah Conservation Fund, Windhoek, Namibia.
- Seidensticker, J. (1986) Large carnivores and the consequences of habitat insularization: Ecology and conservation of tigers in Indonesia and Bangladesh. In *Cats of the world: Biology, conservation, and management* (eds S.D. Miller & D.D. Everett): pp. 1-41. National Wildlife Federation, Washington.
- Sillero-Zubiri, C. & Laurenson, M.K. (2001) Interactions between carnivores and local communities: Conflict or co-existence? In *Carnivore conservation* (eds J.L. Gittleman, S.M. Funk, D.W. Macdonald & R.K. Wayne): pp. 282-312. Cambridge University Press, Cambridge.
- Smith, B.L. (1995) Education to promote male-selective harvest of grizzly bears in the Yukon. In *Integrating people and wildlife for a sustainable future* (eds J.A. Bissonette & P.R. Krausmann): pp. 156-174. The Wildlife Society, Bethesda.
- Wayne, R.K. (1996) Conservation genetics in the Canidae. In *Conservation genetics: Case histories from nature* (eds J. Avise & J. Hamrick): pp. 75-118. Chapman & Hall, New York.
- Weber, W. & Rabinowitz, A. (1996) A global perspective on large carnivore conservation. *Conservation Biology*, 10, 1046-1054.
- Wilcove, D.S., McLellan, C.H. & Dobson, A.P. (1986) Habitat fragmentation in the temperate zone. In *Conservation biology: The science of scarcity and diversity* (ed M.E. Soule): pp. 237-256. Sinauer Associates, Inc., Sunderland, Massachusetts.
- Woodroffe, R. (2001) Strategies for carnivore conservation: Lessons from contemporary extinctions. In *Carnivore conservation* (eds J.L. Gittleman, R.K. Wayne, D.W. Macdonald & S.M. Funk): pp. 61-92. Cambridge University Press, Cambridge.
- Woodroffe, R., Ginsberg, J. & Macdonald, D. (1997) *The African wild dog, status survey and conservation action plan*. IUCN. Gland.
- Woodroffe, R. & Ginsberg, J.R. (1998) Edge effects and the extinction of populations inside protected areas. *Science*, 280, 2126-2128.
- Wykstra-Ross, M. & Marker, L. (2001) Cheetah conservation and human impact in Kenya, Cheetah Conservation Fund, Otjiwarongo.

Cheetah Fast Facts

- Fastest land mammal on Earth; over short distances it can reach a speed of over 60 mph. A sprinting cheetah can reach 45 mph within 2.5 seconds. Top speed—up to 64mph—can only be briefly sustained.
- As the cheetah runs, only one foot at a time touches the ground. There are two points, in its 20 to 25 foot stride when no feet touch the ground, as they are fully extended and then totally doubled up. Nearing full speed, the cheetah is running at about three strides per second. Cheetahs can accelerate to freeway speeds in just a few strides!

Cheetah Websites of Interest

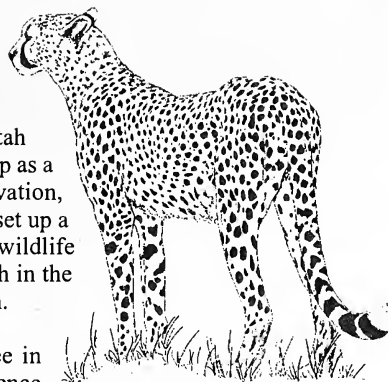
Cheetah Conservation Botswana

www.cheetahbotswana.com

Botswana has one of the last free-ranging populations of cheetah in the world. Cheetah Conservation Botswana has been set up as a long-term monitoring project, incorporating practical conservation, scientific research and community participation. They have set up a research camp in Jwaneng, Southern Kalahari, a 20,000 ha wildlife reserve. They are studying the resident population of cheetah in the area using telemetry, spoor surveying and direct observation.

Rebecca Klein is the project coordinator. She has a degree in Wildlife Biology from Leeds University, UK and has experience in a wide range of conservation projects worldwide.

Dr. Kyle Good is the full-time veterinarian. Kyle studied for her DVM at the Virginia Maryland College of Veterinary Medicine and has had experience on working on a large range of African animals.



Artist: Christine McKnight

The Endangered Wildlife Trust

www.ewt.org.za

The Endangered Wildlife Trust was established in 1973 and is registered as a non-profit organization. The Endangered Wildlife Trust conserves threatened species and ecosystems in southern Africa by: initiating research and conservation action programmes; preventing species extinctions and maintaining biodiversity; supporting sustainable natural resource management; and communicating the principles of sustainable living through education.

Specialist Working Groups collectively coordinate over 90 projects throughout southern Africa. These groups focus on specific issues and ecosystems.

Conservation of Asiatic Cheetah Project (CACP)

www.cheetah.irandoe.org

The Conservation of Asiatic Cheetah Project is a collaborative project involving local and international communities. project inception in December 2001; has been running since September 2001 in collaboration with Wild Conservation Society (WCS), Cheetah Conservation Fund (CCF), and International Union of Conservation of Nature (IUCN).

The project hopes to secure the conservation of Asiatic cheetah in the Islamic Republic of Iran and the related complex of rare and endangered wild species and their natural habitat through a combination of collaborative management, education and awareness building, and direct action.

Cheetah Conservation Fund

www.cheetah.org

Founded in 1990 by Dr. Laurie Marker, the Cheetah Conservation Fund (CCF)'s mission is to be an internationally recognized centre of excellence in research and education on cheetahs and their ecosystems, working with all stakeholders to achieve best practice in the conservation and management of the world's cheetahs. Namibia has the largest and healthiest population of cheetahs left in the world.

Dr. Laurie Marker is Co-Founder and Executive Director of the Cheetah Conservation Fund (CCF).

Mary Wykstra - CCF Representative in Kenya

Mary studied pre-veterinary medicine; has a Bachelor of Science in Zoology and additional professional training in zoo management from the American Zoo and Aquarium Association in Wheeling, West Virginia. Her work with exotic animals began in 1987 as a Zoo Keeper at Binder Park Zoo; she was employed at Utah's Hogle Zoo and chaired a Zoo Keeper initiated fundraising event - The "Cheetah Cha-cha". In 2001 Mary became CCF's Representative in Kenya.

The AfriCat Foundation

www.africat.org

The AfriCat Foundation was founded in 1992 to promote large carnivore conservation and animal welfare. These include research on free ranging large carnivore populations, training and capacity building of Namibians, environmental education and awareness and other assistance.

Africat has two field bases in collaboration with the Namibian Ministry of Environment and Tourism. The sanctuary consists of approximately 500 hectares (1250 acres) fenced off enclosures where we house over 70 cheetahs, 6 lions, 5 leopards and 4 caracals. The AfriCat Foundation is a non-profit organization and is registered as a charity in Namibia.

Carla Conradie, Founder/Director

Cheetah Outreach in South Africa

www.cheetah.co.za

In 1997, founder Annie Beckhelling, launched the project with a hectare of land provided by Spier Wine Estates located in Stellenbosch, South Africa.

The aims of this organization is to increase awareness of the diminishing numbers of free ranging cheetahs in the wild; assist Cheetah Conservation Fund (CCF) in efforts to ensure the survival of the cheetah by fundraising; where possible to breed cheetah in captivity and promote co-operation between captive breeding facilities in Southern Africa.

Iranian Cheetah Society

www.iraniancheetah.org

Iranian Cheetah Society (ICS) is an Iranian, independent, non-profit NGO established in Aug 2001 and works to save the last remains of the Asiatic cheetah, *Acinonyx jubatus venaticus*. ICS was founded by three students, Mohammad Farhadinia (director), Kaveh Hatami and Morteza Eslami. ICS is committed to the following goals: Public awareness about the cheetah and its associated biota through education mainly at the local communities; reducing human-cheetah conflict via implementing socio-economic plans; biological surveys, conserving the cheetah in its natural habitats, particularly through public participation.

ICS has focused a considerable part of its energy on two habitats as ICS Pilot Sites, Miandasht Wildlife Refuge and Abbas Abad Reserve where ICS is conducting several research plans.

IUCN/SSC Cat Specialist Group

www.catsg.org

The Cat Specialist Group is a network of some 200 cat specialists worldwide. This network is responsible for the observation of the status and the conservation needs of the 36 wild cat species and for the continued Red List assessment.

The Cat Specialist Group is one of more than 120 similar groups who make up the Species Survival Commission SSC of the World Conservation Union IUCN. The Cat Specialist Group, as such, does not manage projects, but, in their individual capacities, members are involved in the development and implementation of conservation programmes and projects.

Felid Taxonomic Advisory Group (TAG)

Of the American Zoo & Aquarium Association (AZA)†

www.felidtag.org

This site contains general information including Mission Statement, Working Group Directory, Taxonomy, RCP Species by Region, Regional Collection Plan 2000-2002, Husbandry Related Information, Felid Contraception, Husbandry Manual, Handrearing of Small Felids, Zoo Standards for Keeping Large Felids in Captivity, Zoo Standards for Keeping Small Felids in Captivity, and Special Issue: The Cheetah (*Acinonyx jubatus*)

The African Wildlife Foundation

www.awf.org

For more than 40 years, AWF has played a major role in ensuring the continued existence of some of Africa's most rare and treasured species such as the elephant, the mountain gorilla, rhinoceros and cheetah. AWF has invested training and resources in African individuals and institutions. They have pioneered the use of community conservation and conservation enterprise to demonstrate that wildlife can be conserved while people's well-being is also improved. They have provided crucial assistance to national parks and reserves and promoted international cooperation.

www.carnivoreconservation.org

This website is intended to provide information on carnivore ecology and conservation worldwide. More than 5700 references are provided in this free, searchable database of carnivore literature abstracts. Other information provided includes carnivore issues, theses, opportunity to buy books, internet links, archives, action plans, IUCN Red List, canid news, cat news and small carnivores. The best up-to-date information is provided to carnivore conservationists, scientists and concerned citizens.

Guillaume Chapron manages this site on his personal home page in his free time.

De Wildt Cheetah and Wildlife Centre

www.dewildt.org.za

This facility has gained international recognition for bringing back the cheetah from the brink of extinction through its captive breeding programmes. They are also the first breeder worldwide of the King cheetah (*Acinonyx jubatus rex*). Located in the Magaliesberg foothills in South Africa the facility was established in 1971 where nearly 600 cheetah cubs have been born. The mission is to conserve, breed, and reintroduce indigenous endangered species back into the wild, and to educate the younger generations to appreciate the flora and fauna of their country.

Ann van Dyk, a world authority on cheetah, owns and runs this facility. The centre is a non-profit, non-governmental organization, funded by self-endeavor and sponsorship.

Cheetah Fast Facts

- The Cheetah's paws have only semi-retractable claws, the only one of its type amongst the species of cat, and offers the cat extra grip in its high-speed pursuits.
- Cheetahs do not roar like lions, but they purr, hiss, whine and growl. They also make a variety of contact calls, the most common is a birdlike chirping sound.
- The Cheetah makes facial expressions, using the bold black lines around its muzzle to signal its mood.
- Cheetahs are the only cats that, while sprinting, can turn in mid-air to follow their prey.

Using Scent Attractants to Non-Invasively Collect Hair Samples from Cheetahs, Leopards and Lions

By

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Introduction

Many species of carnivores will rub against inanimate objects (Reiger, 1979), and many but not all species of felids will cheek rub against objects or conspecifics (Mellen, 1993). Cheek rubbing deposits scent (Bradshaw and Cameron-Beaumont, 2000), and can serve as a visual or olfactory means of marking territory (Smith et al., 1989), picking up scent (Wemmer and Scow, 1977) and providing information on reproductive status (Foster, 1977). Male domestic cats, for example, can assess the reproductive status of females from their cheek gland secretions (Verbene and DeBoer, 1976).

In zoological parks, the application of various novel scents, especially perfumes and colognes, has been used to provide behavioral enrichment by attracting felids, encouraging exploratory behavior and eliciting cheek rubbing behavior (Williams et al., 1999; Mellen et al., 1998; Calderisi, 1997). Captive felids typically show strong responses to novel odors in their environments. The reasons for such behavior are not well known but may include over-marking to reaffirm ownership of their territory, gleaning chemical information from the scent, or alleviating routine. In the field, scents applied to hair traps have assisted biologists in attracting felids to collect hair samples for DNA analyses from Canada lynx (*Lynx canadensis*) (Turbak, 1998) and ocelots (*Leopardus pardalis*) (Weaver et al., 2003).

The goal of this project was to document the responses of free-ranging cheetahs (*Acinonyx jubatus*) and other large African felids to novel scents in an attempt to refine methods for surveying felid populations. Specifically, the purpose of the study was:

- 1) To ascertain whether African felids are attracted to novel scents. While captive cats are drawn to a wide variety of fragrances, we wanted to assess the response of free-ranging felids to novel scents where they might i) explore scents because they are unfamiliar and interesting, or ii) avoid scents because they might be associated with human activity.
- 2) Assess whether these scents would elicit rubbing responses that could be used to facilitate the collection of hair samples from African felids. If successful, this technique could be used as an effective tool to non-invasively collect hair samples for genetic analyses.

Methods

To assess the efficacy of both attracting cheetahs to scents and whether hair traps collected a sample suitable for DNA analysis, we first conducted trials with captive cheetahs in the Bronx Zoo. Following those trials, we tested the responses of wild cheetahs (as well as leopards and lions) in situ in South Africa.

We experimented with a variety of commercially available perfume and colognes applied to hair traps. Hair traps were modified from commercial slicker-type dog grooming brushes with stainless steel wires. The handles were removed from brushes, and the pad and wires were nailed to both horizontal and vertical structures within the cheetahs' exhibit.

Zoo Study:

This study involved the Bronx Zoo's pair of cheetahs. The animals (one male and one female

captive-born siblings) were 11 years old at the onset of the project. The study was conducted in their 0.1 ha, outdoor naturalistic enclosure. Twenty-four different perfumes and colognes previously tested on the zoo's Amur tigers, *Panthera tigris altaica* (n = six animals) and snow leopards, *Uncia uncia* (n = 14 animals) were utilized during the study. Each day, three scents were placed in different locations in the cheetahs' exhibit prior to their release into the exhibit from night quarters. Scents were sprayed on both horizontally and vertically oriented objects. The animals' behavior was recorded for 0.5 hr immediately after the cheetahs were given access to the exhibit. Behavioral data collected included: latency to inspect the scent, number of visits to the scent, contact/interaction time with the scent, and behavior at the scent. Data was collected for 24 non-consecutive days, and the cheetahs were exposed to each scent on three different days. Specific scents were never tested against each other on more than one day.

Field Study:

The field trial took place at the Phinda Private Game Reserve, in northern KwaZulu-Natal, South Africa (27°48'S, 32°19'E) in October 2003 (Figure 1). Phinda comprises 14,500 ha (33,350 acres) and measures approximately 42 km long by 3-5 km wide. It contains several distinct habitats including a dry sand forest, savanna, closed mixed bushveld, closed red sand bushveld, dry mountain bushveld, open mixed bushveld, open red sand bushveld, palmveld, and riparian floodplains. At the time of the study Phinda had a small population of cheetahs (n ≈ 8), two lion prides (n = 15 animals), and a population of resident and transient leopards. Lions and cheetahs at Phinda have been intensively monitored since 1992 (Hunter 1998) while leopards are the focus of an ongoing research effort in which individuals are monitored by camera-trapping and telemetry (Hunter *et al* 2003, Balme & Hunter *in press*).

Fifty hair traps were placed throughout the reserve on both horizontally and vertically oriented objects and baited with one of seven scents (Figure 2). The traps were located at the intersections of vehicular trails through the reserve that cats frequently followed. Traps were also placed near specific trees or elevated areas known to be utilized by cheetahs. Traps were checked and re-scented every two to three days. Whenever a cat rubbed against a hair trap, the trap was removed, temporarily stored in a manila envelope and a new trap installed in its place. Hair was removed from the traps using stainless steel forceps and stored at room temperature in small manila envelopes. The hair samples were initially identified by species from tracks at the trap station; later this was confirmed by analyzing the hair samples under microscopy against a reference collection.

We also conducted opportunistic trials (n = 8) whenever we encountered cheetahs, leopards (*Panthera pardus*) or lions (*Panthera leo*) in the field. We tested a pair of cheetahs on two occasions, five lions

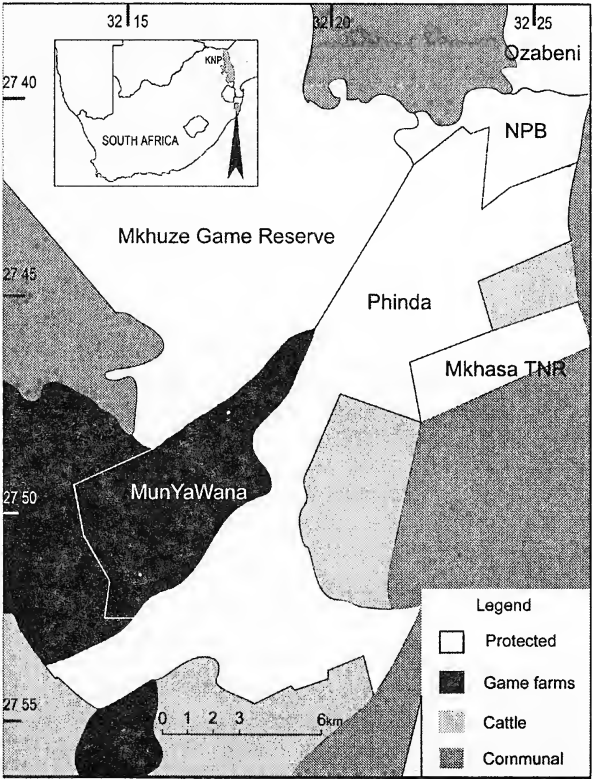


Fig. 1. Location of the field study site, Phinda Private Game Reserve, South Africa

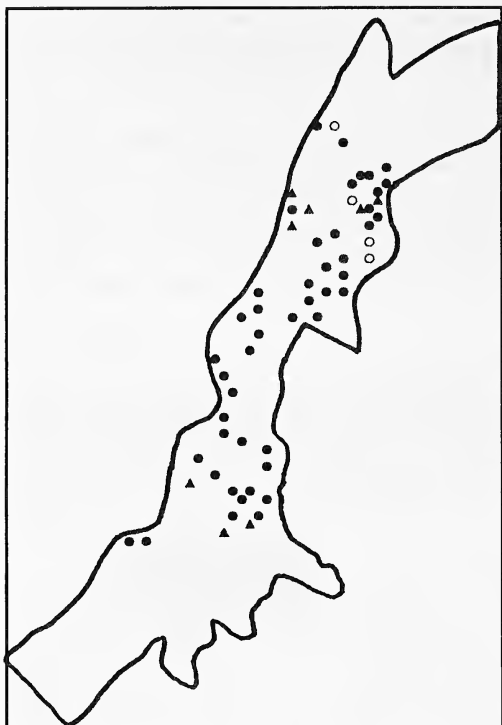


Fig. 2. Location of hair traps within the Phinda Game Reserve (●), traps where hair samples were collected (○), and sites where felids were opportunistically encountered and tested. (▲).

female 10.9 min (sd = 8.5) to locate an area that was scented. The cheetahs typically did not locomote in tandem and came across the scents independently. At no time during the study did the two cheetahs investigate the same scent at the same time.

There was a considerable difference in the cats' responses to the various scents once they were encountered ($X^2_{(23)} = 35.0, P < 0.05$). While nearly all the perfumes and colognes were investigated, only seven (29.2%) of the 24 scents elicited a powerful rubbing response (Figure 3). The cheetahs showed no preference for rubbing against vertical or horizontal structures. On occasion the cheetahs would spend nearly half of the sampling period rubbing against an object that had been sprayed with a particular scent. In general, however, the cats explored most (> 70%) of the scents for less than one minute, and in the majority of instances their responses consisted of simply sniffing the object that had been sprayed with the scent. There was not a significant difference in the amount of time the male and female cheetah spent investigating the scents ($t_{(23)} = 0.66, P > 0.05$). More than half (54%) of the scents were investigated on more than one occasion during the sampling period, with both cats exhibiting similar exploratory rates ($T_{(23)} = 151, P > 0.05$).

The hair traps proved to be very effective in collecting and retaining hair, with traps retaining significant amounts of hair for at least 48 hours even when they were exposed to heavy rain.

Field Study:

Fifty hair traps were set out in the reserve for a total of 864 trap days over a three-week period. Figure 2 shows the locations of the traps within the reserve, the sites where hair was collected from a trap, and the locations where felids were encountered and opportunistically tested. Four traps, baited with three different scents, collected hair samples from big cats: one from a lion and three

on two occasions, 10 lions on one occasion, single leopards on two occasions and a female leopard with two adolescent cubs on one occasion. We conducted these trials when we located animals that were at rest or moving in a predictable direction. When animals were at rest, we drove slowly towards them from an upwind direction to move as near to them as possible without disturbing them. We sprayed a tree trunk, shrub or log with a scent upwind of them, and retreated at least 50m to observe the animals' behavior for a minimum of 20 min. When animals were moving in a predictable direction, we drove well ahead of the cats, sprayed a scent on a piece of prominent vegetation, and moved off. We observed the cats' behavior as they passed the sprayed object until they had walked at least 100m past it.

Results

Zoo Study:

The cheetahs at the Bronx Zoo investigated the vast majority of the scents that were offered to them within the first 0.5 hr that they were given access to the exhibit (Table 1). Each cheetah inspected 21 (87.5%) of the 24 scented sites, with only one scent being ignored by both animals. On average it took the male 12 min (sd = 8.7) to come in contact with a scent, while it took the

from leopards. No hair samples were collected from cheetahs. Hair samples were collected from traps that were attached to both horizontal and vertical structures but we did not have sufficient sample size to test for differences.

Although lions and leopards were fairly equally distributed throughout the reserve (Hunter 1998, Balme & Hunter unpubl data), the four traps that collected hair samples were within approximately five km of each other, in the northern part of the reserve. The hair traps were also investigated by other species including African elephants (*Loxodonta africana*), spotted hyenas (*Crocuta crocuta*), warthogs (*Phacochoerus aethiopicus*), and bushpigs (*Potamochoerus porcus*).

Only one of eight opportunistic tests produced an observable behavioral response, from a female leopard that was at rest when located (Table 2). After spraying a tree approximately 50 m from her, she got up, walked directly to the tree, and sniffed the spot that had been sprayed. Almost immediately she sneezed several times and left. She did not cheek rub the site. In none of the opportunistic trials did any of the species deliberately move away or avoid an area that had been sprayed with a scent.

Discussion

The zoo study documented that cheek rubbing was part of the cheetah's behavioral repertoire, and that perfumes and colognes could elicit this behavioral response. Subsequent studies on the zoo's lions and leopards confirmed that these species (as well as the zoo's Amur tigers and snow leopards) also engaged very frequently in this behavior (Thomas, unpubl data). The zoo study also confirmed that both sexes of cheetahs cheek rubbed against inanimate objects, and that they were attracted to many of the same scents (although there was some individual variability).

The field study showed that certain perfumes and colognes elicited cheek rubbing behavior in free-ranging African felids, although their rate of response was dramatically lower than what was observed with captive animals. While the behavior of the cats indicated that they were not alarmed by the scents and they did not actively avoid them, their response was at best ambivalent. Even adolescent lions and leopards, which might be expected to be more inquisitive, largely ignored freshly deposited perfumes and colognes. This is surprising given the natural curiosity of felids towards novel items and the dramatic responses recorded in captive individuals. One possible explanation is that cats in the wild are presented with a such a wide range of stimuli that novel scents are not worth investigating unless they are associated with conspecifics, food or other more 'relevant' factors. We did not assess the responses of cats to other potential attractants such as blood or the urine of unfamiliar conspecifics so this remains speculative, though previous successes with lynx and ocelot used a scent mixture based on the smells of food (Turbak, 1998; Weaver et al., 2003). Alternatively, perhaps the scents we used were not novel enough to the wild individuals we tested. All individuals in our study were highly habituated to the presence of people (chiefly, tourists in vehicles) and their various smells including, presumably, perfume and cologne. As unlikely as it seems, it is possible that the scents we tested were ignored because they were considered familiar.

The lack of success collecting samples from cheetahs may be related to the fact that their population in Phinda was low during the time of the study. In particular, there were no adult male cheetahs present who, being territorial, may be more likely than other cohorts to respond to a novel scent. There was no direct evidence (e.g., presence of tracks around a trap station) that they ever encountered hair traps, although their behavioral responses during opportunistic testing were not obviously different from those of lions and leopards.

Further work should evaluate whether other scents can effectively induce African felids to cheek rub to collect hair samples for genetic analyses. We recommend a similar two-stage trial process (i.e. on captive animals followed by in situ trials) employing a variety of scents that might reasonably be expected to hold greater interest for wild cats. In particular, smells indicating a possible food source or conspecific might hold greater promise.

Scent	Mean Latency to Inspect Scent (min)		Mean Number of Visits to Scent		Mean Contact Time with Scent (sec)		Behavior (+ = rubbing response)
Allure	-	13	-	0.3	-	2	
Altitude	17	7	0.7	0.7	4	6	
Beautiful	9	14	0.3	0.3	2	2	
Charlie	7	4	2.0	1.7	13	18	
Ciara	5	8	1.3	2.3	66	61	+
Claiborne Sport	22	9	1.0	1.3	8	8	
Crave	-	-	-	-	-	-	
D. Cool Water	18	11	0.3	0.3	5	0.7	
Dolce Gabonna	8	-	0.3	-	4	-	
Drakkar Noir	3	4	2.3	2.0	167	204	+
Dunhill Desire	7	10	1.0	1.7	6	18	
Eau Arpege	13	9	0.7	0.7	2	3	
Escape	15	7	1.0	1.0	17	150	
Eternity for Men	8	5	0.7	1.3	3	14	+
Fahrenheit	12	16	1.3	0.3	9	2	
For Her	16	-	0.7	-	3	-	
Kouros Cologne Sport	-	19	-	1.3	-	7	
L'Air du Temp	3	2.5	2.7	2.3	451	794	+
Mainbo	7	5	1.7	2.0	18	26	
Obsession for Men	5	2	2.7	2.0	464	873	+
Oscar	9	11	0.3	1.7	7	22	
Paco Rabonne	6	5	2.3	1.7	233	181	+
Samsara	4	7	1.7	0.7	40	9	+
Ultraviolet Man	3	3	2.0	1.7	48	37	

Table 1. Responses of Bronx Zoo cheetahs to various scents. Mean latency to inspect scent is rounded to the nearest minute, and mean contact time is rounded to the nearest second.

Trial	Location	Scent	Species	Reaction
1	27° 44' 324" S, 32° 22' 741" E	L'Air du Temp	1 leopard	sniffed & sneezed
2	27° 44' 687" S, 32° 20' 421" E	Obsession for Men and Paco Rabonne	5 lions	ignored scent
3	27° 44' 036" S, 32° 23' 883" E	Paco Rabonne	1 leopard	ignored scent
4	27° 45' 594" S, 32° 19' 996" E	Ciara	5 lions	ignored scent
5	27° 50' 675" S, 32° 17' 213" E	L'Air du Temp	3 leopards	ignored scent
6	27° 52' 314" S, 32° 18' 823" E	Ciara	2 cheetahs	ignored scent
7	27° 52' 363" S, 32° 18' 782" E	Obsession for Men	2 cheetahs	ignored scent
8	27° 44' 845" S, 32° 20' 902" E	Obsession for Men	10 lions	ignored scent

Table 2. Behavioral responses of African felids to opportunistic testing of various scents.

Acknowledgements

This project was supported by a Wildlife Conservation Society Species Survival Fund Conservation Award. We are grateful to CCAfrica for permission to conduct the research on Phinda and for providing ongoing financial support and accommodations for the research team. Our gratitude extends to all at Phinda for their invaluable assistance with special thanks to Kevin Pretorius for his unfailing support.

Literature Cited

- Balme, G., and Hunter, L. *in press*. Mortality in a protected leopard population, *Ecol. Journal* 6.
- Bradshaw, J., and Cameron-Beaumont, C. 2000. The signalling repertoire of the domestic cat and its undomesticated relatives. In *The Domestic Cat: the Biology of Its Behaviour* (eds.D.C.
- Calderisi, D. 1997. Different scents for different responses in predator-prey relationships as a form of enrichment in captive animals. *Proceedings of the Third International Conference on Environmental Enrichment*. pp. 155-161. Orlando, US. 12-17 Oct.
- Foster, J.W. 1977. The induction of oestrous in the cheetah. In *The World's Cats* (ed. R. L. Eaton). Seattle: Carnivore Research Institute. pp. 100-110.
- Hunter, L.T.B. 1998. The behavioural ecology of reintroduced lions and cheetahs in the Phinda Resource Reserve, northern KwaZulu-Natal, South Africa. Unpubl PhD Thesis, University Pretoria, Pretoria, 206pp.
- Hunter, L., Balme, G., Walker, C, Pretorius, K & Rosenberg, K. 2003. The landscape ecology of leopards (*Panthera pardus*) in northern KwaZulu-Natal, South Africa: A preliminary project report. *Ecol. Journal* 5:24-30.
- Mellen, J.D. 1993. A comparative analysis of scent-marking, social and reproductive behaviour in 20 species of small cats. *American Zoologist*. 33: 151-166.
- Mellen, J.D., Hayes, M.C., and Shepherdson, D.J. 1998. Captive environments for small felids. In *Second Nature: Environmental Enrichment for Captive Animals*. Washington: Smithsonian Institution Press. pp. 184-201.
- Rieger, I. 1979. Scent rubbing in carnivores. *Carnivores*. 2: 17-25.
- Smith, J.L.D., McDougal, C., and Miquelle, D. 1989. Scent marking in free-ranging tigers, *Panthera tigris*. *Animal Behaviour*. 37: 1-10.
- Turbak, G. 1998. Seeking the missing lynx. *National Wildlife*. 36: 19-24
- Verbene, G., and deBoer, J. 1976. Chemocommunication among the domestic cats, mediated by the olfactory vomeronasal senses. *Zeitschrift fur Tierpsychologie*. 42: 86-109.
- Weaver, J., Wood, P., and Paetkau, D. 2003. A new non-invasive technique to survey ocelots. Wildlife Conservation Society publication. 22 pp.
- Wemmer, C., and Scow, K. 1977. Communication in the Felidae with emphasis on scent marking and contact patterns. In *How Animals Communicate* (ed T.A. Sebeok). pp. 749-766.
- Williams, N., Chapman, J., and Plowman, A. 1999. Olfactory enrichment for big cats, *Panthera leo persica* and *Panthera tigris sumatrae*. *Proceedings of the Fourth International Conference on Environmental Enrichment*. pp. 300-303. Edinburgh, Scotland. 29 Aug – 3 Sept.

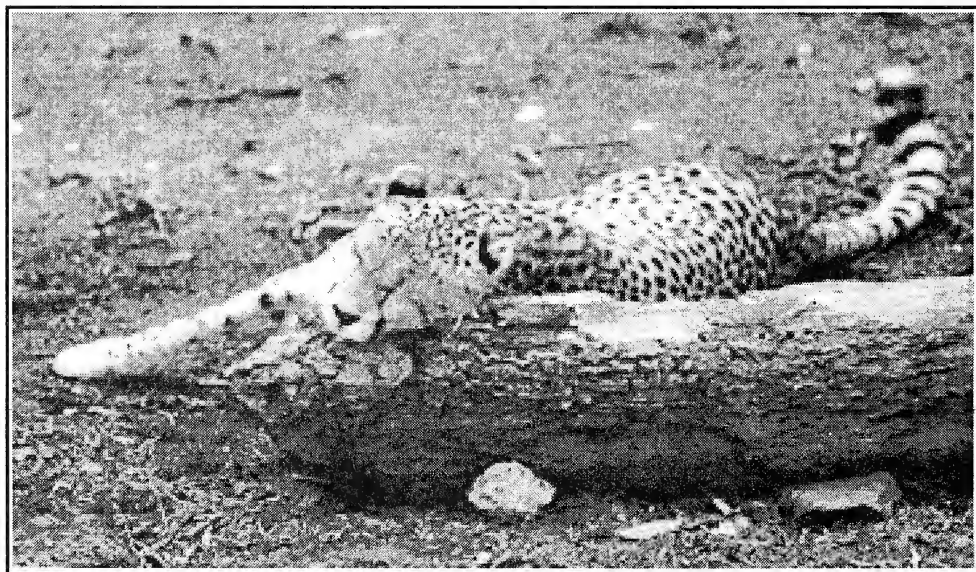


Figure 3. Female cheetah at the Bronx Zoo cheek rubbing against a hair trap sprayed with perfume.
(Photo by Julie Larsen-Maher)

Hand-rearing Cheetah (*Acinonyx jubatus*) Cubs: Weaning Diet

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There are many different viewpoints regarding when and how to initiate the weaning process in exotic felids. The Felid TAG recommends adding chicken or turkey baby food to the milk formula at four weeks of age with small felids. Various zoo facilities recommend weaning when the cubs show interest in solid food. Gittleman and Oftedal (1987) indicated cheetahs first consumed solid food at 33 days of age and weighed 1.94 kg (4.27 lbs.)

As the cubs begin consuming solid foods in a measurable amount, the volume of formula can be reduced proportionately. Many times cubs will take the bottle at some feedings but refuse it at others. Eliminating specific feedings rather than reducing the volume at each feeding allow the cubs to get hungry enough to explore other food options available, such as a bowl of meat.

It is important to weigh cubs every 1-2 days to monitor weight fluctuations during the early stage of the weaning process, especially when multiple cubs are fed together. It is common for different levels of food consumption to occur amongst individuals in a litter. You may be providing an appropriate amount of food to feed four cubs, but two cubs are eating 60-80% of the food. Monitoring the weight will help caretakers determine if all cubs are consuming appropriate amounts of the weaning diet. Another clue that a cub may not be progressing in the weaning process is that it always seems very hungry at each bottle feeding compared to the littermates. In this case, adding pureed meat to the formula for that cub, or separating it to feed from its own dish will ensure the cub gets its share.

At this point, there are no nutrient requirements established by the NRC specifically for cheetahs. Therefore, until more specific data becomes available, the domestic cat is used as the reference model on which the cheetah requirements are based. Slab meat diets typically provide much higher levels of protein than the domestic cat requirement. The cat requirements are generally considered minimum requirements, and are used as a guideline until further research on cheetah nutritional requirements become available.

Table 4: Minimum nutrient requirements for domestic kittens. (DM basis) NRC (1986).

Crude protein = 24%	Zinc = \leq 50mg/kg DM
Crude fat = 9%	Niacin = 40mg/kg DM
Calcium = 0.8% DM	Taurine = 400mg/kg DM
Phosphorus = 0.6% DM	Vitamin A = 3333 IU/kg DM
Magnesium = 0.04% DM	Vitamin D = 500 IU/kg DM
Iron = 80 mg/kg DM	Vitamin E = 30 mg/kg DM
Copper = 5 mg/kg DM	

Appropriate foods for weaning diet

Poultry-based human baby foods (chicken and turkey) are commonly used at the initial stage of weaning. The baby food is gradually added to the formula or placed in a shallow bowl with warmed formula poured over it to entice the cubs. Small amounts of baby food are provided at each feeding, and increased daily as long as the stool appears normal (Felid TAG). This is a common weaning strategy for small exotic cats. It may not be practical with the larger species, including cheetah, except in specific cases involving “poor-doers” or runts of the litter that need special attention and have chronic digestive problems. Chicken baby food has been beneficial in keeping the stool firm, whereas beef baby food is preferable in cubs prone to constipation (Felid TAG).

Poultry has the added benefit in that it is a good source of taurine, an essential amino acid in felids. The requirement for domestic kittens is 400mg/kg DM (NRC, 1986). Uncooked chicken muscle contains, on average, 991 mg/kg DM taurine. Cooking reduces the taurine concentration somewhat (NRC, 1986). However, the Felid TAG recommends cooking chicken prior to feeding to kill *Salmonella*, which can cause diarrhea.

Commercial feline diets for domestic kittens, ZuPreem™ and Nebraska Brand™ feline diets may be offered in a bowl with warmed milk formula poured on top, to entice exploration. As cubs start consuming the diet in measurable amounts, the addition of milk formula to the bowl may be discontinued.

Zoo facilities that feed slab meat to adult cheetahs may prefer to wean cubs onto a meat diet comparable to that of the adults. Muscle meat is low in calcium and high in phosphorus. See table 5 for a comparison of muscle meats and whole prey items. Chicken muscle meat has a 1:21 ratio of calcium: phosphorus, whereas whole chicken has a Ca:P of 1:1 (USDA, 2004).

Table 5: Comparison of muscle meat, organ meat and whole body prey. Values are on DM basis. Dierenfeld, et al (2002)¹; USDA, (2004)²; Ullrey and Bernard, (1989)³

Meat	CP %	Fat %	Ca %	P %	Mg %	Fe	Cu	Zn	Vit A	Vit E	Kcal/kg
						mg/kg	mg/kg	mg/kg	IU/kg	IU/kg	
Chicken, whole ¹	42.3	37.8	1.68	1.3	0.09	40	3.0	45	35600	51.3	5900
Chicken, muscle ² meat only	77.5	22.9	0.04	0.76	0.07	39.6	3.2	50.9	3818	8.7	5382
Chicken heart ²	58.9	35.1	0.05	0.68	0.06	225	13.1	249	1132	0	5774
Chicken liver ²	72.3	20.4	0.03	1.26	0.08	383	20.9	114	471404	29.8	5064
Horse, meat only ³	76	18	0.05	0.34	0.05	232	3.0	128	2593	0	n/a
Cow, meat only ³	63	29	0.03	0.55	0.06	78	2.0	106	1428	3	n/a
Deer, meat only ³	65	29	0.03	0.59	0.06	165	5.0	68	0	0	n/a
Rabbit, whole ¹	63.5	15.3	2.35	1.68	0.16	302	16	86	6200	16.2- 60	5410
Rabbit, meat only ²	74	20.7	0.05	0.8	0.07	58.2	5.37	58.2	0	0	1360
Rat, whole (≥50g.) ¹	61.8	32.6	3.45	1.91	0.15	195	7.5	92.1	35600	139	6370
Quail, whole body ¹ (<i>Coturnix coturnix</i>)	71.5	31.9	3.43	n/a	0.06	74.9	2.6	53.0	70294	66.8	6790

n/a = data not available

Muscle meat and whole animals (birds, rats, rabbits) stripped of fur, tail, head, feet, beak, etc. can be ground up and provided in small amounts in a bowl with warmed formula poured on top at the initiation of the weaning process. Rabbits that were fed nutritionally balanced diets during their lives are considered a “complete food” in that it meets or exceeds the basic dietary nutrients of a kitten without the addition of vitamin or mineral supplements. This is with the assumption that the cub consumes the meat, bone and viscera (except stomach and intestine). Rabbit is generally accepted by cheetahs since it is similar to one of the wild cheetah’s natural prey (springhare).

Vitamin A

Pre-formed vitamin A is an essential nutrient for felids, so must be provided in the diet (Irlbeck, 1996). However, as a fat-soluble vitamin, it is stored in the body, so it is not required on a daily basis. It is important not to provide excessively more than the requirement since it can accumulate in the body to toxic levels. In growing animals, vitamin A toxicity is associated with skeletal malformations and fractures, internal hemorrhage, enteritis, conjunctivitis, and reduced function of liver and kidneys (McDowell, 2000; Robbins, 1993).

In rabbits, vitamin A is contained in the organs, particularly the liver. While cubs are still consuming milk formula, additional vitamin A is generally not required (depending on the nutrient composition of the formula), so organ meat should not be provided at this stage. However, after completely

weaned onto solid food, cubs must consume the liver of rabbits to meet the vitamin A requirement, if vitamin supplements or other food items high in vitamin A are not provided.

Vitamin A is relatively high in whole chicken, rat and quail, and in chicken liver. The whole animals exceed the kitten requirement by 11-21 times, and chicken liver exceeds it by 141 times, by weight (NRC, 1986). If these food items are frequently included in the weaning diet, a vitamin supplement containing vitamin A should not be provided. In addition, combining a diet of one or more of these items with another food item low in vitamin A, such as chicken meat, chicken heart and rabbit muscle meat will help offset the excess. On an "as fed" basis, one ounce (30 g.) of chicken liver provides the daily vitamin A requirement for domestic kittens.

Vitamin D

Natural sources of vitamin D are available in two forms - D₂ which is synthesized in the skin of animals with exposure to sunlight, and D₃, which occurs mainly in plant matter. Most carnivores are able to utilize both D₂ and D₃, although lions and tigers preferentially utilize D₃ (Robbins, 1993). It is unknown as to whether or not this is also the case with cheetahs. Vitamin D is not present in the milk of most mammals, with the noted exception of polar bears (Kenny, et al, 1999). Maternally-raised captive cheetah cubs have reportedly left the lair, for short periods, at 28-38 days of age (Stoeger-Horwath and Schwammer, 2003; personal observation). This may be the point at which cubs require a source of vitamin D₃.

Milk formulas based on KMR™ or Esbilac™ contain vitamin D₃ at levels which meet or exceed the domestic kitten requirement. As long as cubs are consuming the milk formula, D₃ supplementation is not required. In order to maintain proper bone growth, cubs that are weaned off formula at an early age may require access to sunlight (or indoor UV-B light) or a D₃ supplement if their diet contains less than 500 IU/kg DM of D₃.

Calcium and phosphorus

Whole rabbit, rat and chicken provide a balanced Ca:P ratio of 1.4:1 – 1.8:1. All other food items (muscle meat, liver and heart) have a skewed Ca:P ratio in favor of phosphorus. Not only do felids require an absolute amount of calcium and phosphorus (0.8 and 0.6% of the diet, respectively), but they also require a balanced ratio between the two minerals to promote proper calcium absorption. Ca: P ratios of 1:1 to 2:1 are the recommendations for growing infants. (Trendler, 1997). Grinding the skeleton of rats, rabbits and/or chickens and including them in the meat diet will provide a good source of calcium. Grinding must be thorough and large pieces of bone and sharp bone shards are removed before feeding. Cartilage, tendons and ligaments may be offered as a source of fiber.

Meat diets that do not contain bone require the addition of a calcium supplement. Table 6 compares various forms of calcium. It should be noted that supplements can not all be used interchangeably since they have different concentrations of minerals. In addition, calcium may have different absorption rates, depending on the form it's in. Limestone is the least available source of calcium, whereas calcium phosphate and bone meal are more readily absorbed into the body (E. Dierenfeld, pers. com). When adding a calcium supplement, it is important to provide only enough to balance the diet. Too much calcium can be as detrimental as not enough in growing animals. Excess calcium in the diet has been linked to osteochondrosis, enlarged joints, splayed feet, angular limb deformities and stunted growth (Hazewinkel, et al, 1985; Hedhammer, et al, 1974).

Table 6: comparison of calcium supplements. Values on DM basis. Kellems and Church (2002)

Supplement	DM%	CP%	Ca%	P%	Mg%	Cu mg/kg	Fe mg/kg	Zn mg/kg
Bone meal, steamed	97	13.2	30.7	12.9	0.3	----	26700	100
Calcium carbonate	100	----	39.4	0.04	0.05	----	300	----
Dicalcium phosphate (Dical™)	97	----	22.0	19.3	0.6	10	14400	100
Limestone, ground	100	----	34.0	0.02	2.1	----	3500	----

DM= dry matter, CP= crude protein, Ca= calcium, P= phosphorus, Mg = magnesium, Cu = copper, Fe = iron, Zn = zinc

As cubs continue to consume more and more of the meat diet, eliminate formula feedings from the daily schedule, one at a time. Late night feedings can be dropped first, if a bowl of food is provided to allow for self-feeding. The a.m. formula feeding should be the last bottle feeding dropped from the schedule, and may be eliminated by five weeks of age, in most cases. Continue offering warmed formula in a bowl with the solid feline diet. Complete weaning from formula should occur within 10 weeks of age, but cubs will probably lose interest in the formula before then.

Cubs that are weaned onto a slab meat diet may not require a vitamin supplement while they continue to consume formula, if the meat portion of the diet is a combination of chicken meat, whole chicken and rabbit. They will, however, require a calcium/iron supplement if meat only (no bone) is offered. A taurine supplement may be warranted if red meat is offered instead of chicken. Table 7 is an analysis of a diet composed of equal parts of milk formula and chicken meat for a 3.0 kg (6.6 lb) cub.

Table 7: Nutrient analysis of a weaning diet, combining chicken meat and milk formula.

Food Item	CP %	Fat %	Ca %	P %	Mg %	Fe mg	Vit A IU	Vit D IU	Vit E mg	Kcal
Chicken meat, 175g 48g DM	38.8	11.5	0.02	0.4	0.04	1.8	172	0	0.4	265.5
Milk Formula, 180ml 40 g. DM	19.9	21.2	0.7	0.5	0.04	3.1	4473	361	9.1	227.0
Calcium carbonate 1g.	---	---	0.4	---	---	0.3	---	---	---	---
Limestone, 1g.	---	---	0.3	---	0.02	3.5	---	---	---	---
Total	58.7	32.7	1.42	0.9	0.10	8.7	4645	361	9.5	492.5
Requirement	24-40	≤ 40	0.8	0.6	0.08	7.0	290	43.5	2.6	479
Difference	HIGH	OK	OK	OK	OK	OK	HIGH	HIGH	HIGH	OK

The analysis indicates that the milk formula contains an excess of fat-soluble vitamins, so should not be supplemented in the chicken meat. This diet is, however, deficient in calcium and iron unless a supplement is provided. A combination of calcium carbonate and limestone is used to provide an adequate level of iron. Calcium carbonate, while a good source of calcium, is quite low in iron. Limestone, which is a lower quality calcium source, contains ten times the amount of iron as calcium carbonate. The combination of the two supplements provides the necessary concentrations of both minerals. The diet, with supplements, provides a Ca: P ratio of 1.6:1, which is optimal.

The protein concentration of the diet is higher than the NRC requirement. But healthy captive cheetahs typically consume a diet very high in protein, and will continue to consume protein in excess of 50% of the diet in adulthood. The one concern with growing cubs is that they will grow at a faster rate than recommended (8-10% body wt/day). Fast growth rates are associated with abnormal bone growth and deformities (Irlbeck, 1996). During the weaning process, the protein content of the diet may be reduced, if necessary, by mixing the slab meat diet with a commercial feline diet, such as ZuPreem™ or Nebraska Brand™, which contain 43 and 47% CP, respectively (on DM basis).

In general, animals feed to meet their energy needs. Felids metabolize protein and fat for their energy needs (Bechert et al., 2002). Cubs consuming high protein diets may consume fewer calories than expected, based on the maintenance energy requirement (MER). Cubs that maintain an average daily gain (ADG) of 8-10% are meeting their nutritional needs on more nutrient-dense diets. If feasible, continue weighing cubs, at one week intervals, as long as possible until weaned to ensure there is consistent growth.

The crude fat requirement for kittens has not been established by the NRC. For this example, since the cub is still consuming formula, the 40% fat content of formula was used as the maximum. Bechert, et al (2002) indicated a low protein: fat ratio (2:1 to 3:1) was consistent with that found in whole prey and was preferable to higher ratios. The protein: fat ratio of this diet is 1.8:1, which may be appropriate for growing animals.

The high levels of fat-soluble vitamins can not be lowered significantly while cubs are on the milk formula. The high level of vitamin E is actually beneficial in lowering the absorption rate of vitamin A. But it is important to note that the fat-soluble vitamins should not be supplemented until cubs are weaned off the formula, since more than enough is provided. Additionally, liver should not be included in the diet until cubs are weaned off milk formula completely. It should be noted that the milk formula used in this example is the KMR® formula in table 3a. Different formulas, especially those that are less nutrient dense, will have a different nutritional analysis, and may be deficient in some nutrients. The purpose of this example is to show that it is important to know the nutrient composition of the diet prior to adding supplements, and to add only those that are required.

Product List

Nebraska Brand® Feline Diet

Central Nebraska Packing, Inc., PO Box 500, North Platte, NE 69103

1-877-900-3003 www.nebraskabrand.com

Pet Ag™ (KMR® and Esbilac®)

261 Keyes Ave., Hampshire, IL. 60140

1-800-323-0877/ 1-800-323-6878 www.petag.com

ZuPreem™

PO Box 2094, Mission, KS 66202

1-800-345-4767 www.zupreem.com

References

- Bechert, U. ; Mortensen, J.; Dierenfeld, E.; Cheeke, P.; Keller, M.; Holick, M.; Chen, T.C.; Rogers, Q. 2002. Diet composition and blood values of captive cheetahs (*Acinonyx jubatus*) fed either supplemented meat or commercial food preparations. *Journal of Zoo and Wildlife Medicine* 33(1):16-28.
- Dierenfeld, E.S.; Alcorn, H.L.; Jacobsen, K.L.† 2002.† Nutrient composition of whole vertebrate prey (excluding fish) fed in zoos.† National Agricultural Library Z7994.Z65, 20 pp. <http://www.nal.usda.gov/awic/zoo/WholePreyFinal02May29.pdf>
- Felid Taxon Advisory Group (TAG). www.felidtag.org
- Gittleman, J.L.; Oftedal, O.T. 1987. Comparative growth and lactation energetics in carnivores. *Symposium of the Zoological Society of London* 57:41-77.
- Hazewinkle, H. et al. 1985. Influences of chronic calcium excess on the skeletal development of growing Great Danes. *Journal of American Animal Hospital Assoc.* 21:377-391.
- Hedhammer, A, et al. 1974. Overnutrition and skeletal disease in growing Great Dane dogs. *Cornell Vet.* 64 (suppl.5): 1-159.
- Kellems, R.O.; Church, D.C. 2002. *Livestock Feeds and Feeding*, 5th Ed. Prentice Hall, Upper Saddle River, N.J. pp 516-517.
- Kenny, D.E.; Irlbeck, N.A.; Eller, J.L. 1999. Rickets in two hand-reared polar bears (*Ursus maritimus*) cubs. *Journal of Zoo and Wildlife Medicine* 30(1): 132-140.
- Irlbeck, N.A. 1996. *Nutrition and Care of Companion Animals*. Kendall/Hunt Publ. Co., Dubuque, IA.
- McDowell, L.R. *Vitamins in Animal and Human Nutrition*, 2nd Ed. 2000. Iowa State University Press, Ames, Iowa.
- National Research Council (NRC). 1986. *Nutrient Requirements of the cat*. National Academy of Sciences., Wash, D.C.
- Robbins, C.T. 1993. *Wildlife Feeding and Nutrition*. Academic Press, San Diego, CA.
- Stoeger-Horwath, A.S.; Schwammer, H.M. 2003. Chronobiological investigation of four cheetah cubs at Schonbrunn Zoo. *International Zoo News* 50(6): 330-336.
- Trendler, K. 1997. Handraising techniques for large carnivores: lions and leopards. *Proceedings of a Symposium on Lions and Leopards as game ranch animals.* pp. 119-126.
- Ullrey, D.E.; Bernard, J.B. 1989. Meat diet for performing exotic cats. *Journal of Zoo and Wildlife Medicine* 20(1):20-25.
- USDA. 2004. National Nutrient Database SR17. Food composition of poultry and game animal products. www.nal.usda.gov/fnic/foodcomp

* A complete cheetah hand-rearing manual is available by request of the author at zoonutrition@msn.com. Copies are provided as electronic documents (MS Word).

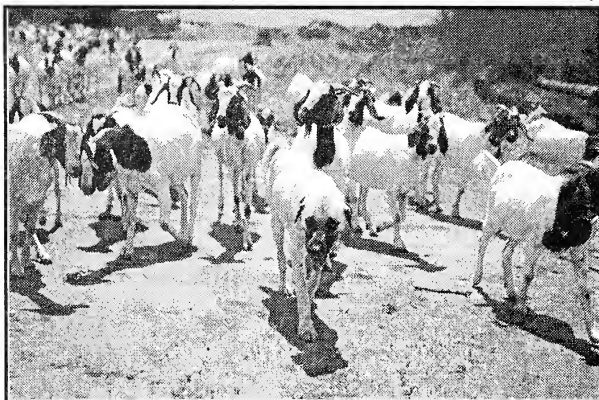
Educating the African Nations

By Annie Beckhelling
Founder/Director - Cheetah Outreach
Cape Town, South Africa

"In Africa, Oddly, Animal World Is Terra Incognita." So read a heading in the *New York Times* of an article by Marc Lacey, and those of us who have the privilege of working closely with African learners unfortunately can testify to the truth of this statement. Field workers and conservationists engage tirelessly to find solutions to cheetah challenges, but without the support of all the stakeholders of this elegant African predator, these efforts may prove to buy time for the cheetah but not a secure future. Each and every citizen who has the power to vote in countries where the cheetah still ranges free is an important stakeholder who can support or undermine *in situ* conservation efforts. We can equip citizens to make informed choices, and build pride in their diverse African wildlife heritage, so critical to the survival of the cheetah. Education is the key. Southern Africa is home to many energetic programs using the cheetah as a learning tool and introducing the uniqueness of this beautiful cat to farmers, learners and teachers.

Farmers, friend or foe, have the most direct impact on current cheetah survival rates outside of protected areas. Each project contributing to this article actively engages farming communities and shares information aimed at reducing farmer-predator conflict. Programs include education about livestock and wildlife management techniques, the importance of bio-diversity and a predator's place in a healthy ecosystem, as well as relocating

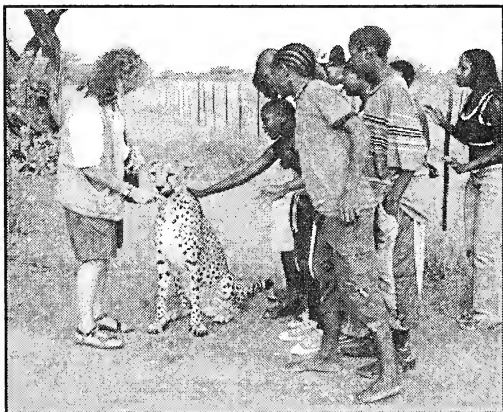
problem animals. These facilities also commented that farming communities express a recognition of predator conservation, but are reluctant to endure stock loss. Sharing innovative management



Anatolian protecting livestock from predators.

(photo: CCF)

techniques such as the Cheetah Conservation Fund's (CCF) Anatolian Shepherd livestock guard dog program has a positive impact on farming communities and improves the cheetah's chances.



CCF's Laurie Marker and Chewbacca show learners the value of a play tree. (photo: De Wildt)

Today's learners are Africa's future citizen and it is here that environmental education can have a powerful impact on perceptions and attitudes. Education outreach is an economical and practical way to carry information to schools. The 19,000 learners reached by CCF's outreach program compared to the 3,000 visiting their excellent educational centre in Otjiwarongo in 2004, demonstrates the value of this approach in countries where distances are large and the cost of transporting numerous learners, even

larger. Skilled presenters deliver curriculum-linked lessons using the cheetah as an example for subjects such as science, mathematics and language. With numeracy, literacy and sciences being key concerns in many emerging African democracies, the ability to integrate lessons into those learning areas gives presenters better access to contact times with learners at schools.

CCF has a multi-level program and delivers a teacher's resource guide concentrating on biology, but also including diverse other subjects such as mathematics, English and social sciences, which can be taught conventionally during the school year. Another approach, "*Meet The Cheetah*", is a result of a CCF and Cincinnati Zoo and Botanical Garden collaboration. This is a small, colorful, simple learning booklet teaching cheetah facts through the medium of game activities and comic strip parables. This gift to students in Namibia becomes a treasured possession and informs by fun. The message on the back page however, underwrites the serious intent of this resource and relates the information to learning standards both in the United States of America and Namibia.

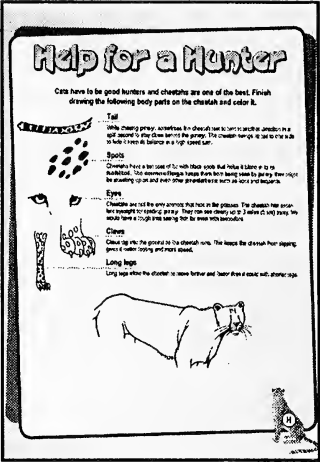
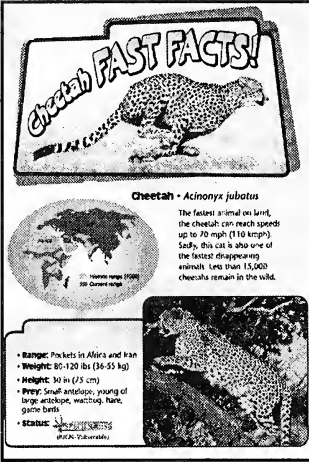
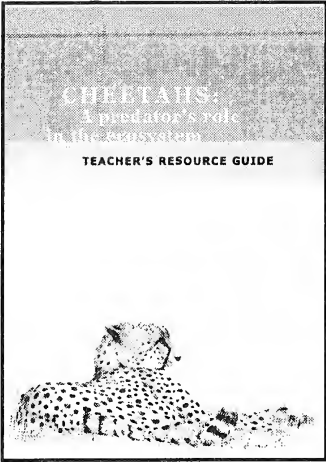
Cheetah Outreach and The De Wildt Cheetah and Wildlife Trust in South Africa face different challenges. South African schools are mostly under-resourced with little or no access to electronic or copying machines. Contact time with learners must be directed to the learning and critical outcomes set out in the education department's curriculum as well as skilling learners. Natural Science was chosen as the medium of AAWARE (Animal Awareness for World and Regional Education) active learning resource built by South African teachers and Cheetah Outreach. There being no other means of visually demonstrating, a full color A1 poster pack accompanies the resource to assist the teacher delivering the lesson to set up the activity. With eleven official languages translation was another key issue. AAWARE is currently available in the four languages used by learners in the provinces in South Africa in which De Wildt and Cheetah Outreach conduct outreach programmes.

Mokalodi Cheetah Conservation Project in Botswana has two simple activity guide books (*Cheetahs: the Shy Cats* aimed at learners aged 5-10 and one for the older 10-15 year old age group), and also conducts outreach programs as well as receiving learners at their home facility. In Zimbabwe, Marwell Zimbabwe Trust has adapted CCF's teacher's resource to comply with Zimbabwe's learning standards. The resulting resource, "*Living with Cheetah, Project for Primary School Children*" will be demonstrated and distributed at teacher workshops.

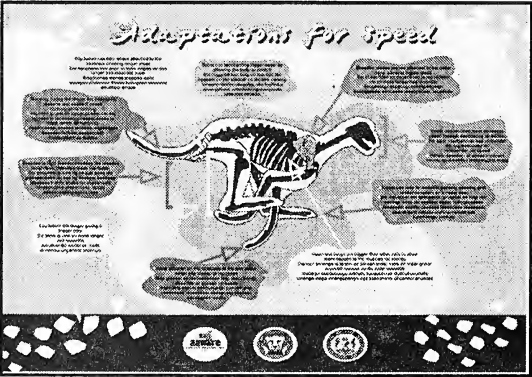
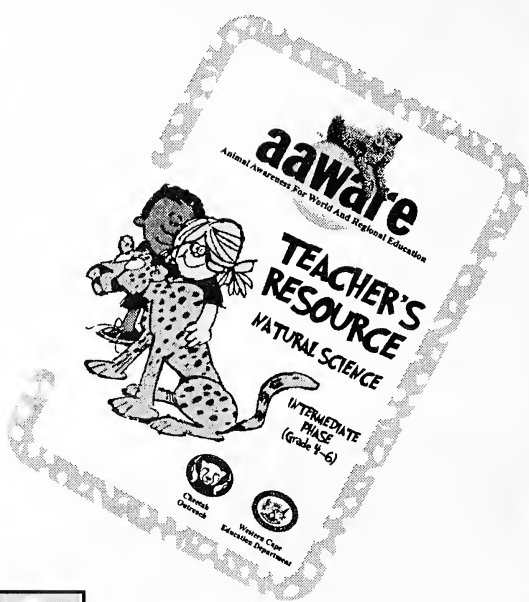
Capacity building within the teaching community through workshops as well as fellowships in the United States in partnership with the Smithsonian Institution's National Zoological Park's Conservation and Research Centre, is also a crucial part of this wide kaleidoscope of effort. Indeed, reading the acknowledgement at the front of each resource underlines the power of partnerships. Each African facility, each American facility acknowledged has a key role in the delivery of our environmental education promises.



Jennifer Buff from SI-NZP CRC and Haily Summerforf from Fort Worth, TX were key presenters at this South African workshop. (photo: Jennifer Buff, Smithsonian)

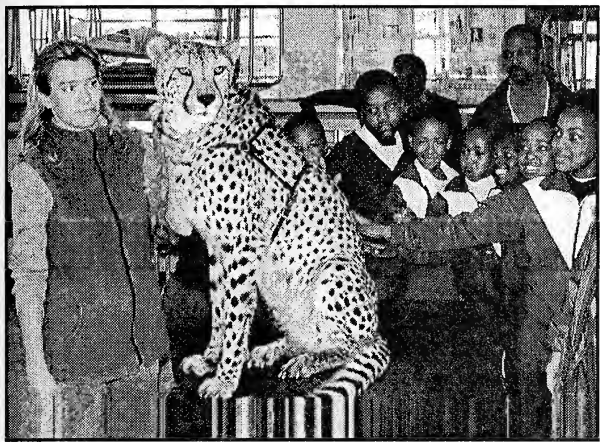


Conventional learning and individual fun learning underwrites the conservation message in Namibia.
(credit: CCF and Cincinnati Zoo and Botanical Garden)



Colorful posters supplement the natural science resource in South Africa.
(credit: Cheetah Outreach)

Often I reflect on an incident which occurred some years ago when I was sharing my home at night with a cheetah ambassador. Standing at the fence, separating a local community from our home, stood a small boy. He never directed his gaze at me, but focussed entirely on the purring cheetah. To



me his words are an eternal spur, "It's beautiful! What is it?". The power of the presence of a living, breathing predator to have an immediate and transforming effect is well known to those of us who have shared partnerships with these astonishing animals. As in America, our cheetah ambassadors are perhaps our most powerful allies. CCF's Chewbacca, De Wildt's Byron, Shadow at Cheetah Outreach, I salute you all.

And what do our clients think:

"I want you to know how much I enjoyed you lerson (sic) and how you changed my life. By just putting my hand on Byron my life changed in an instant"

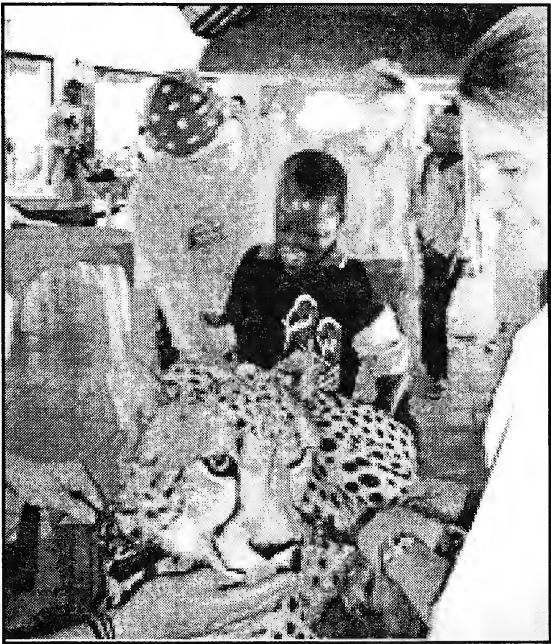
Loato Mokoena

"I want to tell you that your education have change me. Your education have change me to respect animal and to take animals like a human being. Your message is very bueatiful. (sic) "

Mpho Tladi

"Byron the cheetah, God must bless you."

Thuli



De Wildt's Handsome Byron
(photo: De Wildt)

In Africa animal world is *terra incognita* no more.

Using Weight to Determine Pregnancy in Cheetahs (*Acinonyx jubatus*)

By Craig Saffoe, Senior Cheetah Keeper
National Zoological Park, Washington, DC

Employing non-invasive management techniques for collection animals is a priority throughout the National Zoological Park (NKP). In January of 2001 staff at the NKP Cheetah Conservation Station (CCS) began weighing cheetahs on a weekly basis. Although weighing monthly is sufficient for assessing general health, we believe that monitoring weekly provides more consistent information on the cats in our collection. In addition to the health benefits of weighing cheetahs, keepers have noticed that weekly weights provide information that may be useful in determining if a female that has recently bred is actually pregnant. We know that analysis of excreted progesterone metabolites in fecal samples can indicate if a female has ovulated after copulation. These data, however, cannot determine if that female is indeed pregnant until at least 70 days after the breeding date. The progesterone concentrations of a cheetah that has ovulated increase above baseline by 10 - to 100 - fold. This level will be maintained for about 60 days (give or take several days) and then will fall back to near baseline. If fecal progesterone remains at baseline for more than two or three days, then it is almost certain she has gone through a "false pregnancy". If the cheetah is pregnant, however, the progesterone will rise again around Day 65 - 70, and remain elevated until birth. The data shared in this report is not meant to suggest anything definitive. It is intended to initiate discussion about possible management strategies for a difficult species.

NKP has been attempting to breed cheetahs since 1999. As of 1 January 2005 we have had eight breeding introductions that led to successful copulations and one artificial insemination (AI) attempt. While there was confirmed intromission in all of the natural breedings, only one yielded cubs. The AI attempt did not produce cubs. All breeding activity involved some combination of the following animals:

male studbook # 2659 (Norok) – born 21 December 1991

male studbook # 3304 (Amadi) – born 18 October 1994

female studbook # 2800 (Wandu) – born 20 March 1992

female studbook # 3003 (Jomu) – born 4 June 1993

female studbook # 4568 (Tumai) – born 19 April 2000

None of these cheetahs had bred prior to their arrival at NKP. This report will focus on the females involved in each breeding attempt and the information gathered during the suspected gestation period. It is important to note that each female's diet was increased by 0.2 kg. at each 30-day interval of suspected pregnancy.

Jomu

A successful copulation between Jomu and Amadi occurred on 14 February 2000, before initiation of the weekly weighing protocol. Conception did not occur. On 25 March 2002, Jomu was artificially inseminated with freshly collected semen from Amadi after pretreatment with Norplant® to suppress ovarian activity. For the post-AI period fecal progesterone data (chart J – 1) and weight information (chart J – 2) are presented. The Progesterone Chart shows a clear increase in steroid concentrations, beginning shortly after the AI. The progesterone dropped to near baseline just before Day 60 and remained there for over seven days. This indicates that this was a false pregnancy. The Weight Chart shows a gain of 5 kg. from her breeding weight to the weight taken after Day 60. At this point the weight stopped increasing and even dropped slightly.

Chart J - 1

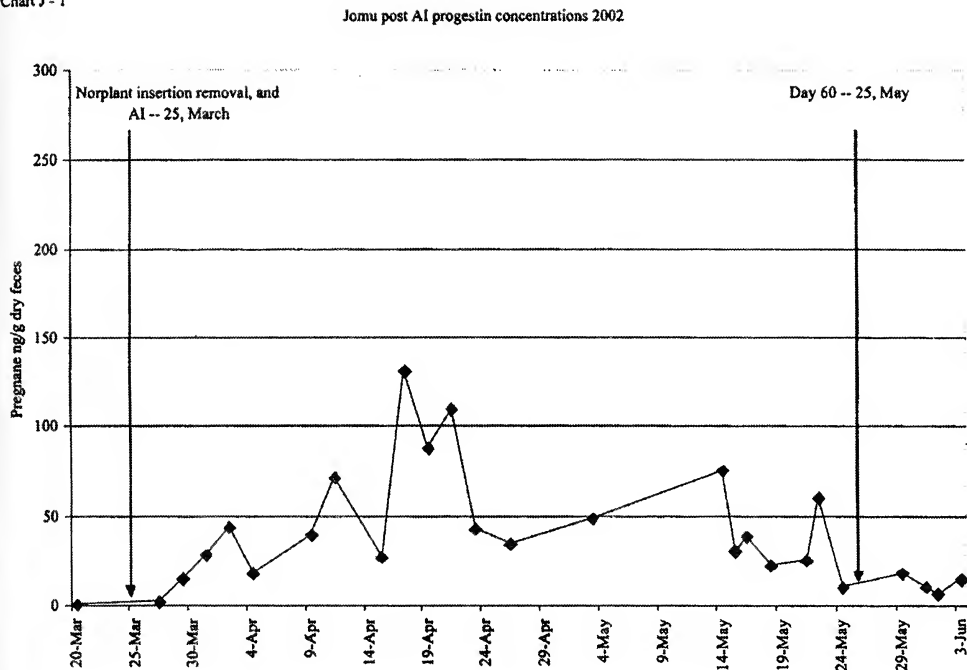
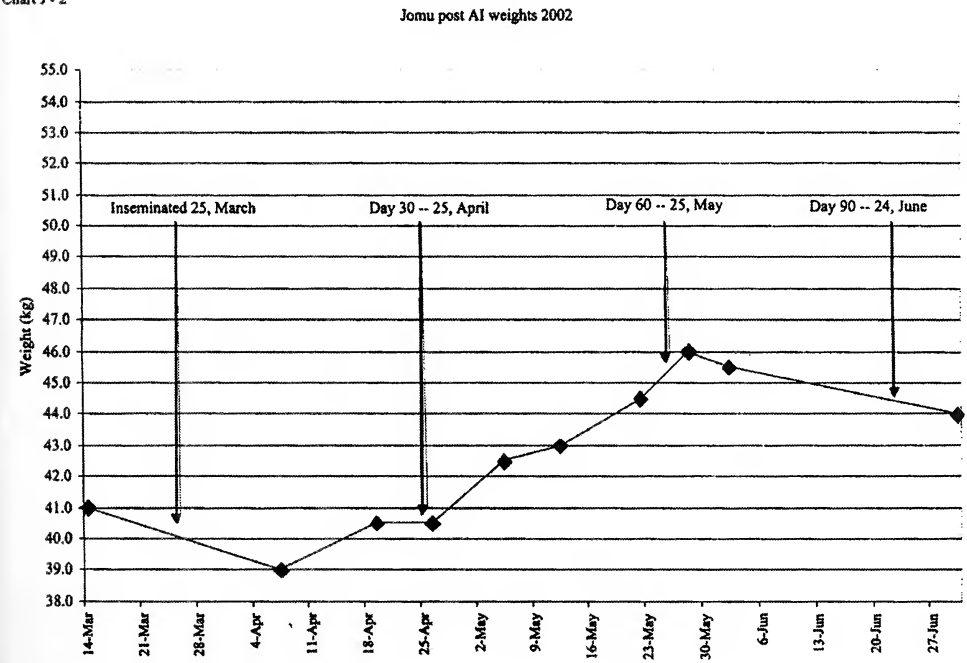


Chart J - 2



Wandu

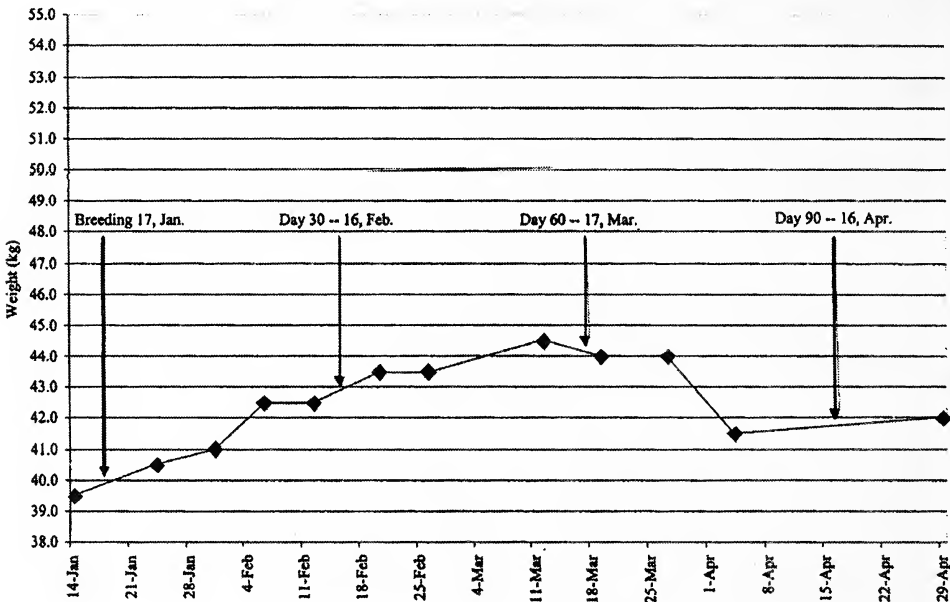
Between January 2001 and June 2004 Wandu had six breeding encounters with Norok. Two of these encounters spanned two consecutive days each and during one of the encounters there were two breedings in the same day. The encounter dates were:

17 January 2001:

The weight information from this post-breeding period (chart W – 1) showed a weight gain of 5 kg. just before Day 60. After this peak, the weight dropped slightly and then leveled off. Wandu did not give birth, so this period was considered a false pregnancy.

Chart W - 1

Wandu post breeding weights (breeding #1) 2001



17 and 18 April 2001:

The weight information from this post-breeding period (chart W – 2) showed a small weight gain of 2 kg. at the peak around Day 70. She never showed a steady weight gain during this period and the weight she did gain could be explained by diet increase. Progestin analyses were not conducted, but it is possible she did not even ovulate after this copulation.

26 July 2001:

The weight information from this post-breeding period (chart W – 3) showed a gain of 5 kg. at the peak just before Day 60. After this peak, the weight dropped and then leveled off. She exhibited a larger increase in weight just before Day 90, but could have been due to a scale malfunction. She did not give birth so this period was considered a false pregnancy.

Chart W - 2

Wandu post breeding weights (breeding #2) 2001

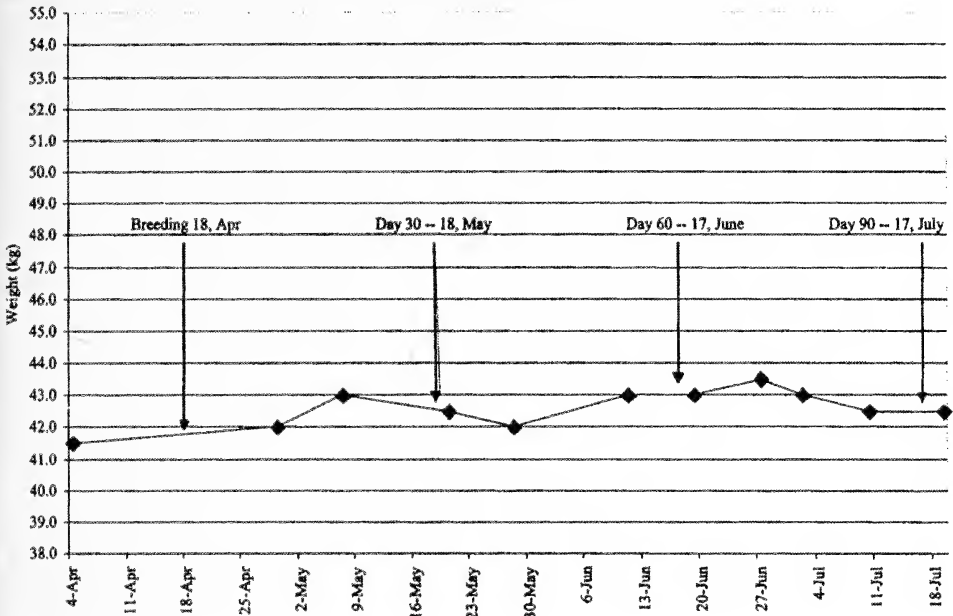
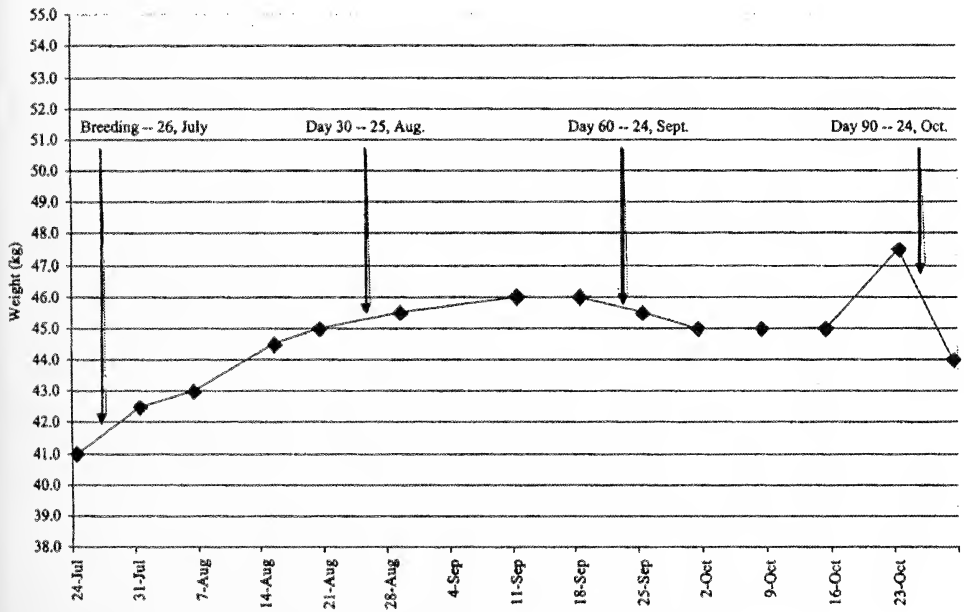


Chart W - 3

Wandu post breeding weights (breeding #3) 2001



10 July 2002:

There were two separate breedings between Wandu and Norok on this day. Progestin data were available for this post-breeding period (chart W - 4). An increase in progestin concentrations after breeding indicates that she ovulated. Just after Day 60 the progestin dropped to near baseline and remained there (with the exception of one spike) for over a week. This is a classic false pregnancy profile. The weight information (chart W - 5) from this false pregnancy showed a gain of 6 kg, just before Day 60 and then the weight dropped steadily through Day 90.

Chart W - 4

Wandu post breeding progesterin concentrations 2002

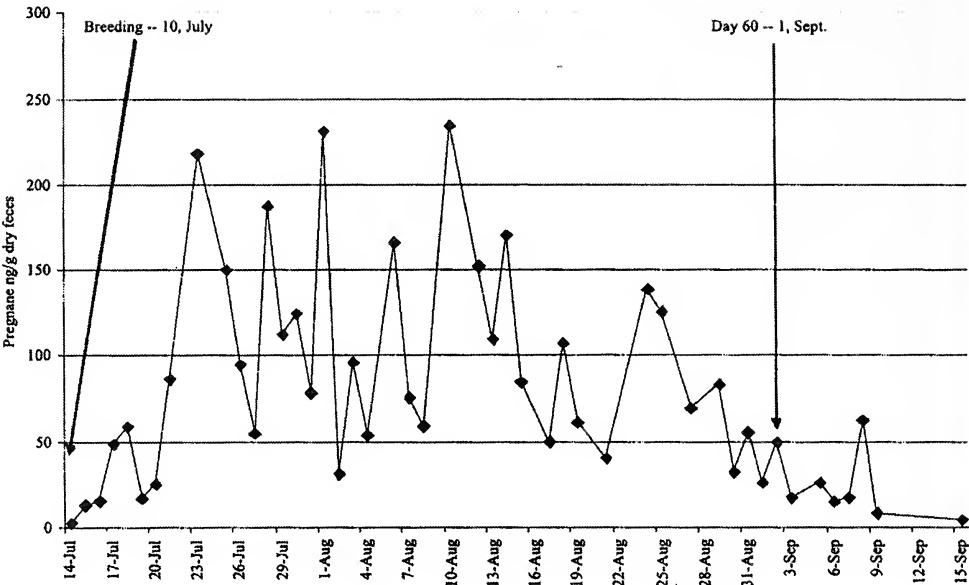
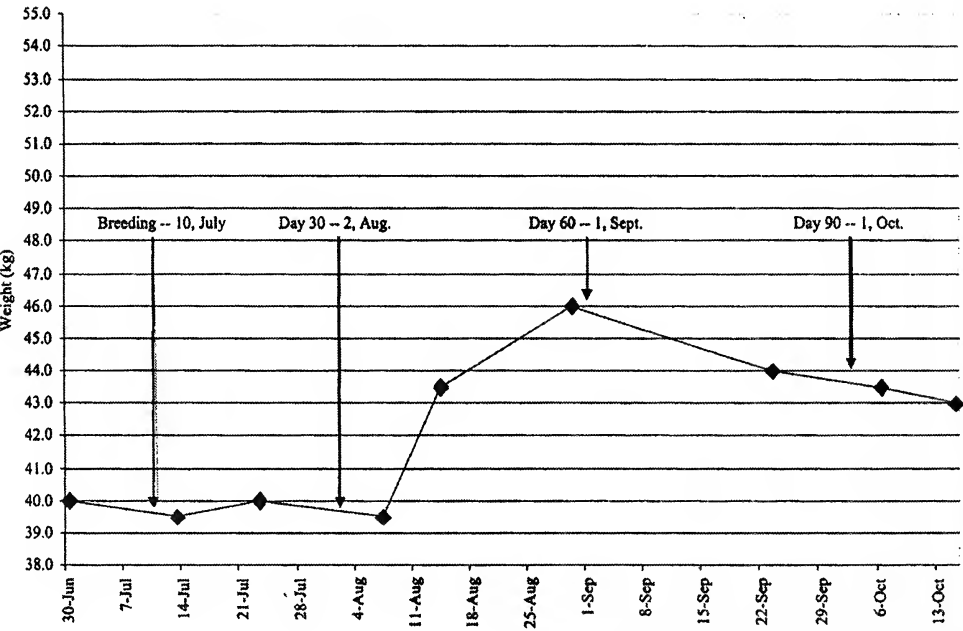


Chart W - 5

Wandu post breeding weights 2002

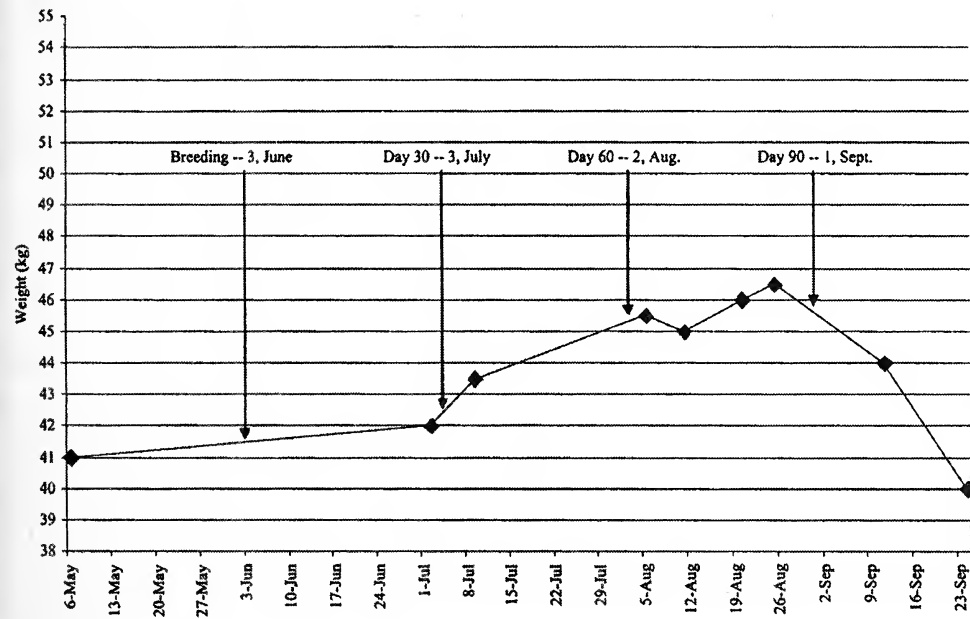


2 and 3 June 2003:

The scale used to weigh cheetahs was out of order from early May until early July, so the closest weighing date to breeding was about one month before. The trend shown in the weight chart (chart W – 6) from this post-breeding period still provides valuable information. The weight gain for this period continued until it peaked close to Day 90 (much later than the previous peaks). After that, her weight dropped more rapidly as well. Wandu was closed into a maternity stall on 8 September due to signs of possible parturition exhibited. When no cubs were observed and she was shifted out of that area on 13 September, keepers found three paws from a small mammal in her stall. The paws were taken to the zoo’s pathology department, which identified them as possible squirrel paws (although not with 100% confirmation). This cat has killed squirrels in the past, but in those cases she either did not eat the animal or left only the tail. There is some speculation that the paws may have been those of a cub(s) that was born (possibly a stillbirth) and then eaten, but nothing was confirmed.

Chart W - 6

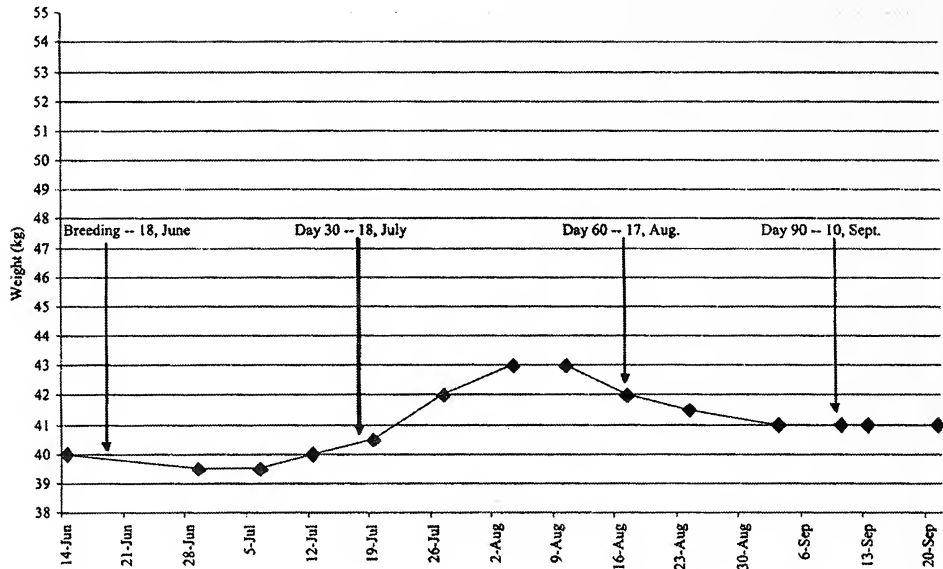
Wandu post breeding weights 2003



18 June 2004:

The weight information from this post-breeding period (chart W – 7) showed a weight gain of 3 kg. from her breeding weight to a peak just after Day 50. After this peak, the weight steadily declined and leveled off by Day 90. Wandu did not give birth so this period was considered a false pregnancy.

Wandu post breeding weights 2004

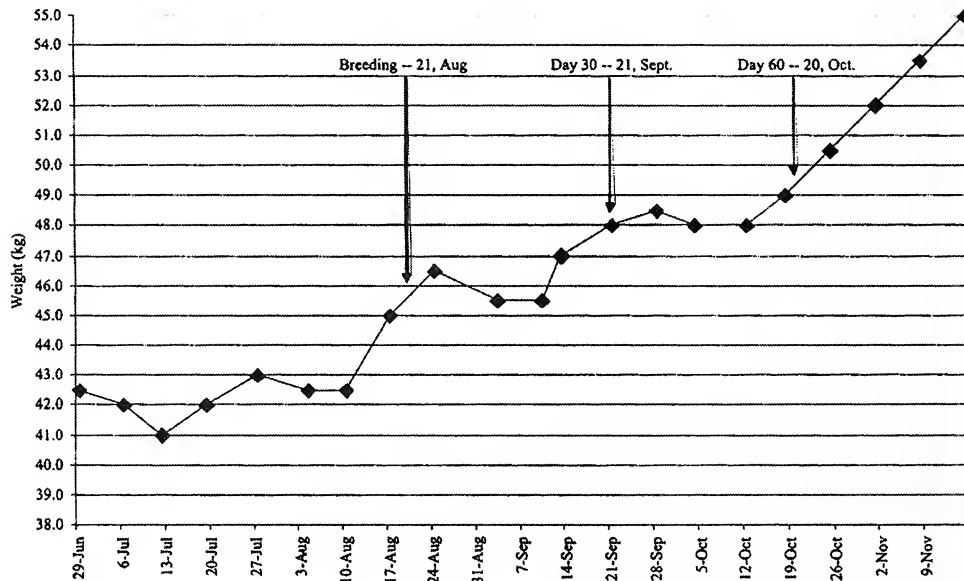


Tumai

On 21 August 2004 Tumai was introduced to Amadi for breeding. The weight chart for her during this post-breeding period showed a gain of 4 kg. from the breeding date to Day 60. After Day 60 her weight continued to increase for a total weight gain of 10 kg. before she gave birth on 23 November 2004 to a litter of four cubs.

Chart T - 1

Tumai pregnancy weights 2004



In conclusion, the ability to analyze progesterin concentrations in feces is a valuable tool for helping cheetah managers understand what is happening physiologically to the animals in their care. Fecal analyses can confirm that a female has ovulated after mating. Because progesterins during a false pregnancy are elevated for only 1/2 to 2/3 the time of a pregnancy, it is technically possible to diagnose pregnancy based on sustained concentrations after 70 days post-breeding. Unfortunately, it takes weeks to dry fecal samples for progesterin analysis. Once dried it then takes several days for the samples to be extracted and the steroids to be analyzed by enzyme immunoassay. By the time fecal progesterin data are available, the female is at or very near the end of her gestation period. So while progesterin testing is important, the information it provides is primarily useful as a hindsight tool. Ultrasound is another technique that is sometimes used to diagnose pregnancy in recently bred cheetahs. If a facility has a female that is conditioned to and will not be severely stressed by an ultrasound procedure, and the veterinary staff are trained to conduct such an examination, then it is a reliable means of diagnosing pregnancy.

The weight information reported in this paper suggests there are significant weight gains up to Day 60 or so of a false pregnancy, and at that point the weight levels off or begins to drop. There were only two occasions during which the weight gains continued past Day 60. One of those cases was a confirmed pregnancy and the other presented some question about conception. After reviewing the weight charts in this report, it can be suggested that there is merit in further investigating the ability of using weight data to determine if a female cheetah is pregnant. Like fecal progesterin testing, weighing is noninvasive and nonstressful, but weighing is simple and yields real time data. Thus, in the long term weekly weighing may be useful for assessing pregnancy status and an important tool for managers involved in cheetah breeding programs.

Cheetah

By Luke Hunter, PhD. and Dave Hamman, Photographer, 2005

New Holland Publishers, Ltd.; South Africa, Cornelis Struik House, 80 McKenzie Street, Cape Town, 8001

ISBN 186872719X

Hardback, 144 PGS. \$34.95

*Review by Kayla Grams, Biological Science Technician
U.S.G.S., Grand Junction, Colorado*

I was excited to receive and review this book as I have traveled to Africa and participated in Cheetah Conservation. When I received this book it looked like the perfect "coffee table" book. Unfortunately, I have no coffee table and do not drink coffee. There is more to this book than just looks, although one could definitely just sit and page through the incredible photography of Dave Hamman and others. I thoroughly enjoyed the creative layout of the book. The book combines photography, art, interesting facts and field notes. Boxed in questions and interesting facts draw you into wanting to read more.

The book has seven chapters. The first two chapters cover the cheetah in history and the evolution of the cheetah. Cheetahs were popular and easily trained and their connection to humans is quite interesting. Their distribution changed drastically throughout their history, thus leading to their decline. Did you realize that the cheetah may have lived in North America? After doing a little bit of research in Namibia, I remember thinking that this was quite interesting. Can you imagine seeing cheetah running around the grasslands of North America?

In chapters three, four and five the author discusses social and ranging behavior, reproduction and parenting, and hunting. Once thought to be solitary, males actually form coalitions where male siblings will stay together throughout their life. He also discusses cannibalism in cheetah, and how reproduction in captivity contrasts to wild cheetah. And finally how do cheetah hunt, what do they hunt, and do they cooperate when they hunt? Throughout these three chapters the author brings you into the field with segments from his field notes which I enjoyed reading.

What threats face the Cheetah? Genetic diversity, predators and competitors, and humans all pose threats. The authors' final chapter discusses the future and survival of the cheetah. The author also lists the top spots to see cheetah, tourism being an important means in protecting wildlife.

I would highly recommend this book to both the lay person and the professional. For those that do not know much about the cheetah, it gives thorough information creatively laid out that does not bog you down into reading just plain text. As a professional I believe it is a great resource. If you do not like to read much, the book is worth getting for the fantastic photography alone.



The Global Cheetah Forum

*Ensuring the survival of the cheetah through
integrated conservation, education and
research programmes*

Background

The cheetah (*Acinonyx jubatus*) is a Vulnerable species on the IUCN Global Red List and an Appendix I species in the Convention on International Trade in Endangered Species (CITES 2002). The fastest animal on Earth, cheetah are found in a wide variety of habitats ranging from open plains and savannah to arid or semi desert regions and thick bush. Historically, cheetah ranged widely throughout Africa and southwest Asia. Today however, free-ranging cheetah inhabit areas of North Africa, the Sahel, eastern and southern Africa only. The largest known populations exist in Namibia, Kenya and Botswana. Over the past 50 years, cheetah have become extinct in at least 13 countries and it is believed that between 12 – 15 000 cheetah remain in the wild. Although the species faces different problems in different parts of its range, the main causes of decline are human-cheetah conflict and a vast reduction in suitable, secure habitat.

In response to the urgent need for a comprehensive, global cheetah conservation strategy, cheetah conservationists from 13 countries congregated in South Africa in both 2001 and 2002 to develop a Global Cheetah Action Plan which was facilitated by the Conservation Breeding Specialist Group Southern Africa and sponsored by the North American Cheetah Species Survival Plan (SSP). The result was an initial Global Cheetah Action Plan developed in 2001 and revised and updated in 2002. This Global Action Plan deals with cheetah health, *in situ* and *ex situ* population management, the protection of cheetah outside protected areas, the international cheetah studbook, cheetah censusing methods and education and awareness.

During these workshops, the group identified the need for a forum to continue facilitating their collaboration, resource sharing and networking. Many of these organisations and individuals had been working in the same field and on similar projects for years and had never, until then, met or communicated with each other. This therefore provided the impetus for establishing the Global Cheetah Forum as a tool to facilitate their continued collaboration, communication and partnership building.

The Global Cheetah Forum

The Global Cheetah Forum (GCF) is a neutral, global forum which aims to support and facilitate the efforts of cheetah conservationists worldwide, through communication, collaboration and integration. Its goals are to facilitate open dialogue between the role players and stakeholders in cheetah conservation, to assist in problem solving, encourage and support sound scientific research on cheetah, provide a link between *ex situ* and *in situ* cheetah conservation programmes and promote the interests of cheetah conservation globally.

Structure

The GCF secretariat is currently held by CBSG Southern Africa, a regional network of the IUCN's Species Survival Commission's CBSG in partnership with the Endangered Wildlife Trust. The GCF currently has more than 70 members in 14 countries. These members are served by a list serve and receive a quarterly electronic newsletter called "The Fast Track" to which they contribute. Financial

support for the group has been received from the Columbus Zoo, the North American Cheetah Species Survival Plan, the Wassenaar Wildlife Breeding Centre (Holland) and Diana Twining.

Objectives of the Global Cheetah Forum

To....

- Facilitate and foster open and effective communication between workshop participants and other cheetah conservationists worldwide;
- Educate and inform the general public and other stakeholder groups on matters relating to cheetah conservation;
- Facilitate dynamic, interactive collaboration and information exchange between various role players in cheetah research and conservation, worldwide;
- Facilitate fundraising for cheetah research and conservation and channel funds into needy projects;
- Encourage and support sound scientific research on cheetah;
- Encourage an holistic approach to the conservation and management of cheetah ;
- Provide a link between *ex situ* and *in situ* cheetah conservation programmes;
- Act as a forum through which obstacles facing effective cheetah research and conservation can be addressed and dealt with;
- Provide a forum for channelling queries and requests for information or participation from cheetah conservationists, as well as members of the public, to the appropriate organisations / individuals;
- Act as a neutral mouthpiece for cheetah conservation organisations worldwide; and
- Keep the processes initiated at the Global Cheetah Action Planning workshop “alive” and dynamic.

For more information please see
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or contact us on + 27 (0) 11 486 1102
brendad@ewt.org.za
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Information on The Global Cheetah Forum was provided by Yolan Friedmann, Conservation Manager/ Endangered Wildlife Trust; Programme Manager/Conservation Breeding Specialist Group (SSC/IUCN) Southern Africa.

Cheetah Breeding Program at Wassenaar Wildlife Breeding Centre

*By Louwman J.W.W. and Louwman J.C.M.
Wassenaar Wildlife Breeding Centre, the Netherlands*

Cheetah breeding results in zoos have always been rather poor. Even nowadays only very few facilities breed cheetahs repeatedly every year. It is suspected that the low birth rates are due to inadequate husbandry of cheetah in zoos, as results largely differ per facility.

Cheetahs seem to need a somewhat different husbandry than other big cats. To meet those requirements the Wassenaar Wildlife Breeding Centre in the Netherlands established in 1980 a protocol for breeding cheetahs. Much had been done to try replicate the cheetahs' life in the wild as much as possible. The strategy proved rather successful and resulted in the birth of 210 cheetahs up to December 2004 (62 litters). Some of these cubs were born in other facilities, but their mothers had been bred at Wassenaar and left WWBC pregnant. Wassenaar cub survival rate during the first six months of age is 88%.

The cheetahs in Wassenaar are maintained in nine different (large) enclosures (1000-1500 m²), with a natural setting of grassland, hills, trees, bushes and rocks. Males and females kept separate for most of the year. Isolating them during long non-breeding periods resembles the solitary life of cheetahs in the wild. Exceptions are, of course, mothers with young or males living in a coalition. The male and female enclosures are located in separate areas of the centre. This avoids most kinds of contact between the animals. This is important, as it seems that potential mates, that become familiar with one another, gradually lose interest in mating and start to act like littermates.

A third part of the centre is used as breeding area, where the cheetahs only stay for a few weeks. In consultation with the species coordinator, new breeding pairs are formed by carefully selecting unrelated mates. Often one of the mates originates from other facilities. Both potential mates are transferred to the breeding area and placed in a special designed breeding enclosure (40 x 22 m) (see map).

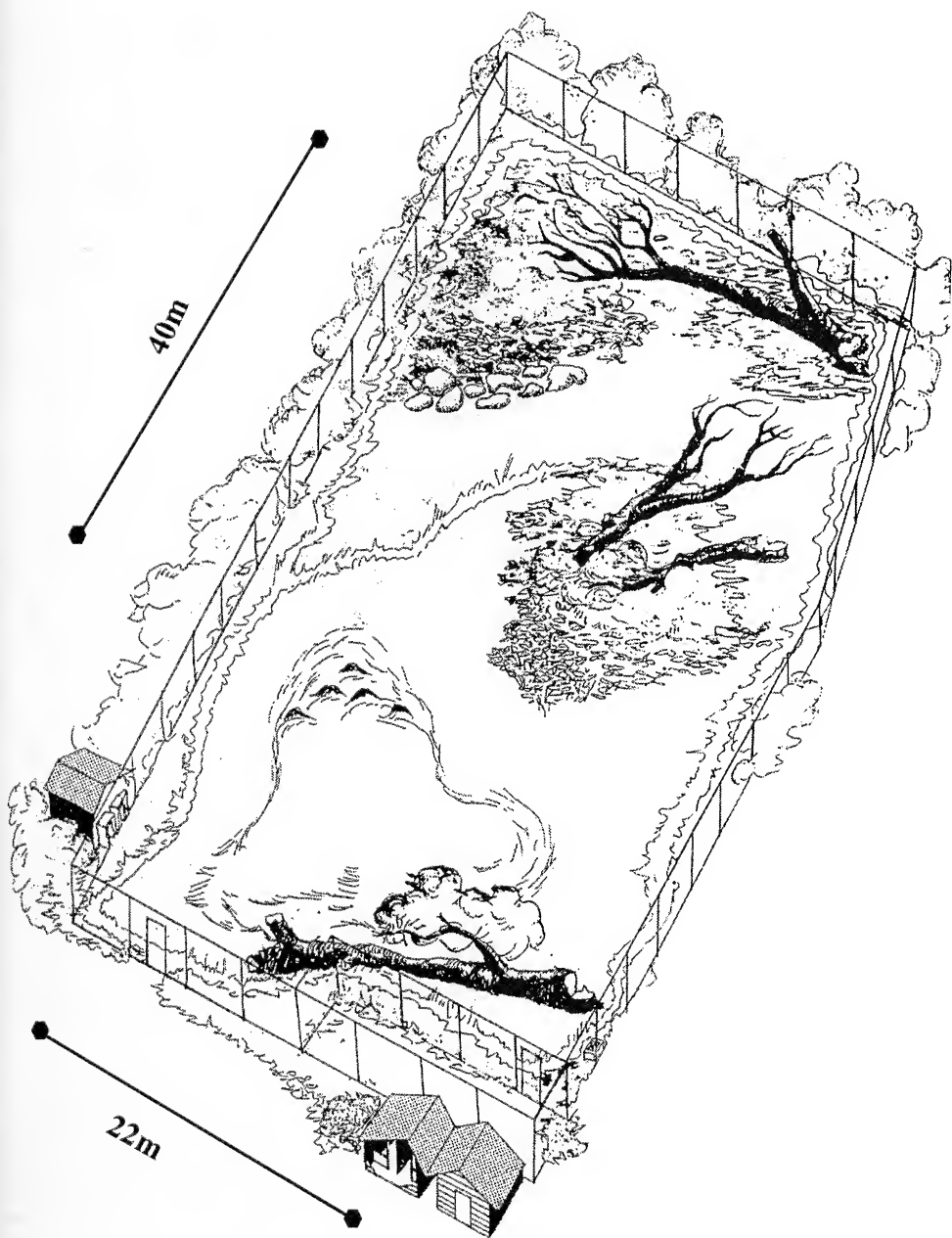
The strategy used by Wassenaar includes having the male and female, by turns day and night, being placed in the large outdoor enclosure or in one of the two separate indoor enclosures. In the beginning both mates are not allowed to have physical or visual contact with one another. They do notice each other's scent markings scattered on all kinds of landmarks in the outdoor enclosure. This tells them that a newcomer of the opposite sex has passed through their area some hours before. When the male or female, by turns, are allowed into the empty enclosure, their behaviour is carefully followed. It is important to pinpoint the correct two days the female is receptive. Introductions which take place too early or too late, often result in aggression and fighting. Behaviours that are followed are the male's spraying urine against trees and inspecting the scent markings of the female by sniffing and licking. Later, after the next switch, the female will also show some interest in the scents and will intensify its urine spraying.

On the day the male starts hurrying from one new scent marking to the other, indicates that the female will very soon come into heat. Then the male starts to call to the female, using loud yipping sounds and followed by stutter calls (it means something like "where are you, I am here"). Now a first visual contact between the mates is permitted through wire netting. If mutual interest is displayed and the male shows an erection and the female a slight swelling and discoloration of the vulva, the female will be given access to the breeding enclosure with the male. If aggression is observed or the female does not exhibit oestrus behaviour soon after introduction, both cheetahs are separated again. The first mating usually occurs within five minutes.

When the female displays rolling behaviour directly after copulation, it is considered to have been successful. During about 48 hours male and female remain together and only two to four more matings will occur. On the third day they always lose all interest in each other and are therefore not united anymore, although they remain in the breeding enclosure.

After three weeks, when the female fails to come into heat again, the male and female are brought back to their former enclosures. Here the female has a maternity den to her disposal. It is here she will give birth and rear her young safely, far away from other cheetahs or other animals.

Wassenaar Wildlife Breeding Centre Cheetah Breeding Enclosure



References

- Beekman, S.P.A., Wit M. de, Louwman, J.W.W. and Louwman J.C.M. Int. Zoo Yearbook 1997, 43-50, Zool Soc. Of London
- Caro T.M. 1994 Cheetahs of the Serengeti Plains. University of Chicago Press
- Lee A.R. 1992. Management guidelines for the welfare of zoo animals – cheetah. Federation of Zoological Gardens of Great Britain
- Oorschot W.van. 1998. Management guidelines for mother-reared cheetahs in captivity. V. Hall Institute, Leeuwarden, The Netherlands
- Oorschot W.van. 1998. Cheetah single cub litters in captivity. V.Hall Institute, Leeuwarden, the Netherlands
- Schüling K. 1990. Vergleichende untersuchungen zum Verhalten des Geparden in menschlicher Obhut. Westfälische Wilhelms Universität Münster
- Wit M. de, Beekman S., Louwman J.W.W. and Louwman J.C.M. and Colenbrander B. Breeding Cheetah at the Wassenaar Wildlife Breeding Center, 55-64, Int. Cheetah Studbook 1994-95
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A Summary of the Cheetah Program at the San Diego Zoo's Wild Animal Park.

By Paula Augustus, and Kelly Casavant, Senior Keepers
Zoological Society of San Diego, San Diego, CA

The San Diego Zoo's Wild Animal Park was opened in May of 1972. Since that time, over 125 cheetah cubs have been born at this facility. Our cheetah population is housed in an off-exhibit area adjacent to the main park at the Behavioral Biology Research Station. In the past, behavior and reproductive research have been conducted by the staff from CRES [Conservation and Research for Endangered Species. This is the research branch of the Zoological Society of San Diego]. The facility links animal management and research goals, with CRES keepers working closely with the Mammal Department. Current research includes collecting fecal samples from the females for hormone analysis and linking those values with behavioral data. As keepers, we work to balance the needs of animal care with the needs of the researchers.

Our current population of cheetahs consists of three females and five males. Of that number, all three females are of breeding age. Three of the males are actively interested in the females. We are currently working on breeding two of the females.

Our cheetahs are housed alone, with the exception of a male coalition. The pens are adjacent to each other with connecting gates. The keeper staff services the cheetahs by entering the pen to feed, clean, mow and do pen maintenance while the cheetahs remain in the pen. We are able to accomplish many things by this such as training, shifting and separating cheetahs in breeding situations. Some of our cheetahs are crate-trained, the most successful being 1.4 cubs started at ten months of age. Two of these females are still in our collection and the rewards have been numerous. The time spent early on continues to serve both humans and animals for quick crating for exams or if being transferred to the main park exhibit. The cheetahs are comfortable with little to no stress involved. Adult cheetahs have proven to be more challenging but not impossible.

All of our cheetahs are also gate-trained to move from one pen into another, which is very beneficial. Cheetahs are shifted primarily for husbandry reasons with the added bonus of this being the best enrichment we can offer. The facility is located on the edge of natural chaparral habitat. Housed in such a natural area, each pen offers grass, trees, shelter, different terrains and native wildlife, all of which the cheetahs quickly get used to. Moving them around stirs up activity in all the cheetahs, whether the cheetah goes into a new pen or just gets a new neighbor.

This is just a brief overview of our husbandry practices. We welcome any inquiries for more detailed information or any questions or comments. The sharing of information benefits the animals and also their keepers. We look forward to input from other cheetah keepers. We can be contacted by e-mail at creswapkeeper@sandiegozoo.org or by mail at the Behavioral Biology Research Station, CRES, 15500 San Pasqual Valley Road, Escondido, CA 92027.

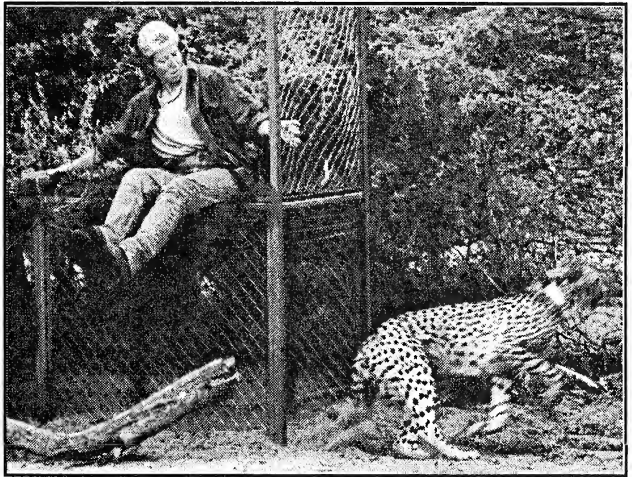
Cheetah Conservation Botswana

By Nancy Vandermey, Volunteer
Exotic Feline Breeding Compound's Feline Conservation Center, Rosamond, CA

My fourth trip to Africa, in November 2003, began with an email to the wildcats mail list. A new organization called Cheetah Conservation Botswana was looking for volunteers for a minimum one-month time period. The cost (which goes directly to the project and also covers lodging, meals, and local transportation costs) was extremely reasonable. Other similar volunteer opportunities are much pricier. Botswana has one of the largest free-ranging cheetah populations remaining, but local farmers still persecute them and consider them pests.

Rebecca Klein, the CCB project coordinator, met us at the airport in Gaborone. We were to spend the first night at Mokolodi Nature Reserve. The CCB office is located at Mokolodi, which is just outside of Gaborone ('Gabs'). In the morning, the project veterinarian Kyle Good picked us up for a visit to Mokolodi's two tame cheetahs, Duma and Letotse. They were orphaned as cubs. We then met the field biologist Ann Marie Houser whom we would be working with for the next month. We then headed off to Jwaneng, a town about 150km from Gabs where the field project is located. A very large diamond mine run by Debswana Mining Company (part of DeBeers) is located there, and they have established the Jwana Game Reserve around the mine itself.

Many animals have been introduced into the reserve - kudu, impala, springbok, eland, gemsbok (oryx), zebra, wildebeest, duiker, steenbok, giraffe, and red hartebeest - and are doing well. The only predators are small ones - brown hyena, cheetah, and jackals mainly, with a few leopards. Warthogs dig holes under the fence around the reserve, and the farmers around the reserve claim that the mine's cheetahs are killing their goats and cattle. The project is radio-collaring cheetahs in the reserve and collecting other data to determine if this is true. They also talk to local farmers about ways to protect their animals, such as timing the births of their animals to coincide with the births of the wild game animals, redesigning their corrals ("kraals") to keep cheetah out, or keeping an aggressive mother donkey with their herds.



Biologist Ann Marie Houser releasing a collared cheetah.

On arriving at the game reserve, Ann Marie stopped at a 'crime scene' on the way in. A hartebeest lay under a tree - was it a cheetah kill? She told us how to read the signs and tracks. A cheetah kill will usually have its neck twisted back from the cheetah lying across the animal's body to strangle it, and you may be able to find the mark made by the cheetah's dewclaw when it pulled the animal down. This kill had been made by several cheetahs, either a mother with cubs or a coalition. We then settled into the volunteer housing which turned out to be a small "A" frame building with two comfortable beds and a table. Ann Marie lived in a trailer a short walk down the road, past the transfer pens used for temporarily holding cheetahs. She had worked in Namibia before with the Cheetah Conservation project there, learning pen design and all about cheetah research. The pens have shade cloth on the walls so the cats can't see humans, as even wild adult cheetahs will become habituated to humans quickly in captivity.

We were ready to start work at 0700hrs the next day. We learned how to tell cheetah tracks from

brown hyena and jackal and baboon tracks, and heard how a leopard track would look different. Part of our job for the next month would be to note cheetah, hyena, and leopard tracks on a map of the park. If fresh cheetah tracks were found, we would set up a trap to try to catch and radio-collar it. They had caught and collared a female with five cubs the previous month (the first month of research). We also looked for playtrees, which are trees or tall termite mounds of a certain shape that cheetahs use as communication stations, marking them with scat to tell other cheetahs who is in the area. We would also be mapping roads in the park, as the maps supplied by the mine were very outdated.

We found many kills by following the 'smell of death". We found many hartebeest kills, as well as a young eland and female kudu, all larger than normal cheetah prey - is it because they are the top predator here? We also saw many birds - the camp birds were sparrow weavers and masked weavers, as well as a vulture family across the road. Black-winged korhaans were ubiquitous while driving around the park, and we also saw several pairs of secretary birds, a martial eagle, various smaller raptors, a woodpecker, yellow-billed hornbills, turico sunbird, and several kori bustard, Africa's largest flying bird.

We went on a night drive with a spotlight and saw jackals, an armadillo, springhare, and ..glowing green eyes.. Cheetahs! Probably the collared female and a few of her cubs. We looked at her tracks that night and the next morning to see how they aged. We worked on the cheetah pens, picking up endless bits of wire the workmen had left in the pens. We used extra shade cloth in the area for various projects, such as a hammock and a screen door for the chalet, and a shade tarp for the back of Ann Marie's truck. We would be driving to Maun, a nine-hour drive, and with the tarp one person could sit in the back with four in the cab. The back of the truck turned out to be the most comfortable position! It was a VERY hot drive. The TransKalahari Highway had just been completed a few years earlier; it used to take two to three days to drive to Maun. In Maun we met with Chris Kruger of Okavango Wilderness Safaris. He owns a farm outside of Gumare that he is developing into a



Volunteers assisting with cheetah exam.

tourist property, and has indicated we can release problem cheetah there so Ann Marie needed to check it out. After spending a night at his Maun worker's compound, we made the long drive to his place, arriving just before a beautiful sunset. We saw tracks of several leopards along the way. It's a magical moment when nine wild dogs (pair plus seven large pups) arrive at the waterhole and stay until dark. After dark we were visited by zebra, wildebeest, and an elephant at 0300hrs. There are no fences allowed in this area as it's an elephant migration route. We were close to the border of Namibia.

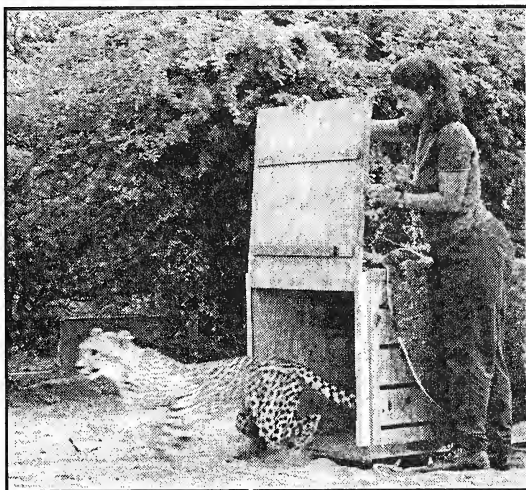
On the drive back we had to pick up a cheetah trap, and all were grateful to spend the night at a farm outside of Ghanzi. The next day we visitd

another farmer and talked about nonlethal predator control, such as the swing gates he installed to keep warthogs from digging under the fences. The farmers in this area think cheetahs are very common, and more of a problem than leopards because they kill more often. A second research camp has been established in Ghanzi since my visit. The next day there is a predator control talk in Jwaneng that Ann Marie, Rebecca, and Kyle went to, while the volunteers got a chance to relax. As we were about to leave for a picnic, we heard that a cheetah had been killed by a car the previous week. We split up and looked for cheetah tracks. We found a wonderful fresh set of tracks (adult plus at least two cubs) near a waterhole less than 2km from camp! We went to look at the body and I found it to be a young cat, maybe 18 months old. We were relieved it's not the collared mother.

Kyle and Ann Marie collected bones for further studies. The next day while looking for tracks again, we saw two young (about six month-old) cheetah cubs running away from us! We set up a trap near the waterhole. We caught a baboon that night, and another the next day. We needed better bait than the guinea fowl we were using!

The next day we drove roads mapping the west half of the park, using GPS because the Landrover® has no odometer. At 1615hrs we decided to call it a day and head in by a scenic route. What's that crossing the road in front of us? A cheetah! I climbed on the roof and saw three more to our right, which rejoin the fourth one behind us. All were similar sized - is it a coalition of adults, or a mom with three large cubs? We headed in to tell the others, going a little too fast approaching the gate, when - another cheetah ran across the road in front of us! We slowed down, looked to our right, and there's ANOTHER cheetah, very young and terrified of us! We kept driving, as we didn't want it to cross the main mine road again which they had both just crossed.

In the meantime, Ann Marie had borrowed a young goat from a local farmer and put it behind the cheetah trap. Our trap setup had the bait in a small cage, the large cage right next to it, with acacia branches blocking access except through the open doors on each end. A pressure plate in the middle then releases doors on each end when the animal steps on it. The bait was unharmed. The next morning, we all drove out to check the trap. We stopped some distance away and observed with binoculars. The trap gates were down, but was anything in it? I looked to our left, and there behind a bush was a cheetah! In the trap was another one. In fact there were two to our left, both then walked over to the trap and visited the captive one. All were adults, so we assumed it's a coalition of three males. Cheetahs in the wild are known to form coalitions of adult males, while adult females live alone. We transferred the captive cat to a squeeze box, then to a holding cage that we replaced the goat cage with. Now instead of using goats for bait we used the cheetah itself - its friends would come to visit, and the only way to get next to their friend was to enter the trap cage. I reset the trap cage, getting hissed at by the captive as I did so. We returned the goat to the farmer, it had done its job. We then went off to track the collared female (named Jenny). That afternoon a second cheetah was caught! It was transferred to the holding cage, while the first was released into the large cheetah pen we spent a lot of time working on. The next morning we were all confused at what we found at the trap - the third cheetah had been caught, but an adult female with two cubs was also visiting outside the traps. We moved the second cat to the pen, the third to the holding cage, to see if we would trap yet another cheetah. Kyle the vet was coming the next morning to perform physicals and place a radio collar on one cat. The project would like to use satellite collars, but they are very expensive. The project has since obtained an ultralight aircraft, so they can track multiple cats without spending all day driving around the reserve. Also, when other research areas are established in Ghanzi, Maun, and the Tuli block, the project will have to have a plane to monitor all four areas regularly. In the afternoon we tracked Jenny again, mapped more roads, and built an examination area near the cheetah pens.



Volunteer releasing a cheetah.

Ann Marie explained the different jobs we would be assisting with (health chart, medicine chart, measurements). Blood, fur, and skin samples would be collected. Kyle used Telezol®, and the cat went down fast. We had overestimated its weight, thinking it was male. Surprise, it's a female. She weighed 37 kg. Females got ear tags and transponders on the left side. We took pictures of her spot patterns for future field identification. This female didn't get the collar, as we are hoping to put that on a male. The other two were together in the pen, and we had to get one in the small pen. The transfer system worked smoothly, and this one was soon in the squeeze box. Another surprise - not

only was this one female too, but she's was very far along in a pregnancy. They were both four to five years old - what were adult females doing hanging out together? This had never been seen before in cheetah studies in other countries, such as Namibia, South Africa, Kenya, and Tanzania. They decided to collar the pregnant one. The third one turned out to be another female of about the same age, possibly pregnant as well but not very far along. DNA testing will determine if they are related, and hopefully the collar will tell us if they stay together as a female coalition. Could the other female with the two cubs have been part of the group, and left when she had cubs? CCB has picked a great place in which to start their research!

We tracked Jenny again that evening with Kyle; they spent the night to see us release the cats. The cats ran out of the cages very fast, but we got a few good pictures. That afternoon we found the signal from the new collar. On another night drive, we saw giraffe, a genet and then spot six pairs of eyes in the grass - it was Jenny and the cubs! It was our last day in camp. We walked to a nearby tower for the sunset, and found fresh cheetah tracks of an adult and two cubs. If we were staying, we would have tried to trap them. Thursday morning the volunteers went to find Jenny and it took four hours! It was satisfying, but sad to hear our final "beeps".

The CCB website is

<http://cheetahbotswana.com/>, for more information or to start planning your own volunteer adventure! Since my month there they have established a second camp, obtained a microlight aircraft for tracking, relocated problem cheetah, hired a community development officer, and determined that over 20 cheetah use Jwana Game Reserve as part of their range.

All photos by the author.

Iranian Cheetah Conservation

*By Laurie Marker, PhD.
Founder/Executive Director
Cheetah Conservation Fund*

The last half-century has seen the rapid decline of the world's last Asiatic cheetah. They are now extinct throughout the majority of their historic range, including Russia, India and the Middle East. The last stronghold of Asiatic cheetah is found on the edge of Dasht-e Kavir, a large area of desert and shrub steppe. This final population of critically endangered Asiatic cheetah occurs only in fragmented territories on the outer-ring of the Kavir Desert. Current estimates place the cheetah population in Iran at 50 to 60 individuals, a statistic boldly reaffirming the need for immediate cooperation and planning. The main threats to its survival are illegal killing and poaching, and habitat disturbance and degradation. Much of the cheetahs' former habitat has been converted to agriculture and other uses. In addition, lands have been fenced making it difficult for wildlife to move and the remaining range lands have been overgrazed that have lead to desertification. There is direct competition between wild and domestic livestock and antelope. Camels and other livestock often dominate and pollute water holes making them inaccessible to wildlife.

My first trip to Iran was in October 2001, where Cynthia Olson, one of the Cheetah Conservation Fund's (CCF) International Scientific Advisory Board members and I worked with the Department of the Environment, Office of the President, Islamic Republic of Iran (DOE), to help initiate an international project to assist the country in saving the last of their cheetah. The project, "Conservation of the Asiatic Cheetah, Its Natural Habitat and Associated Biota in the I.R. Iran" (CACP) has been running since September 2001 in collaboration with DOE, the Wildlife Conservation Society (WCS), the International Union for Conservation (IUCN), the Centre for Sustainable Development (CENESTA), and CCF. The project is being funded by a grant from the United Nations Development Program (UNDP) Global Environmental Funds (GEF).

Iran considers the cheetah an important part of its natural and cultural heritage and as such it has become a symbol of its conservation efforts, not only for cheetah, but of the environment as a

whole. The CACP-GEF has as its goal the recovery of Asiatic cheetah and its prey. The mechanisms for reaching this goal include establishing a baseline of population data for all target species, research into ecology of and associated biota, environmental education to improve the popular perception of cheetah, enhanced law enforcement to protect cheetah and their prey, especially in PA's, and development of a co-management system for cheetah habitat involving local stakeholders. WCS is involved in assisting the development of the baseline population data and advising on other aspects of the project.

In September 2002 George Schaller and Tim O'Brien (WCS) conducted preliminary surveys of cheetah and prey in the Kavir National Park, the Khar-Touran Biosphere Reserve in Khorasan and Semnan Provinces, and the Dar Anjir Hunting Prohibited Area in Yazd Province. In May 2002, Gus Mills visited Naibandan Wildlife Refuge, and Tim O'Brien returned to Kavir NP and Khar-Touran BR. In addition, Eric Sanderson (WCS) worked with the DOE/GIS/RS lab to develop a cheetah database and a GIS database for the five proposed study sites; Kavir, Khar-Touran, Naibandan, DarAnjir, and Bafq. Tim O'Brien visited Tehran in October 2003 to assist in the analysis of survey data, design the Naibandan survey and help organize the many databases that DOE is developing.

In August, 2001, an Iranian, non-profit NGO was established called the **Iranian Cheetah Society (ICS)**. The society was founded by three young enthusiast natural resource students and is working to save the last remains of the Iranian cheetah. The ICS had been studying cheetahs for five years before official establishment and has made remarkable progress in activities over the past few years. The ICS is based in Tehran and has 300 members from all over the country. Its main goals are:

- Public awareness on the cheetah and its associated biota through education mainly at the local communities
- Reducing human-cheetah conflict via implementing socio-economic plans
- Biological surveys to know more about the Iranian cheetah
- Conserving the cheetah inside its natural habitats, particularly with the aims public participation.

In January 2004, I had the opportunity to travel to Iran for the second time to assist with cheetah conservation strategies in the country. Along with 12 other international specialists, including those listed above, and several others who are members of CCF's International Science Advisory Board, I participated in a three-day international workshop on the conservation of the Asiatic cheetah. The workshop was hosted by CENESTA and included partners in the conservation of Asiatic cheetah including the local communities in the peri-Kavir region. The workshop, attended by Iranian government officials, conservationists from around the world, Iranian camel herders, and small-stock farmers, sought solutions to the problems they face with the last few remaining cheetahs (less than 50) left in Iran. The workshop served as an opportunity to examine past efforts, assess the status of the species and plan long-term conservation strategies with stakeholders across the Iranian cheetahs' range.

The merging of national and international experts with local communities laid the foundation for a week of productive dialogue regarding the future of the cheetah in Iran. Government officials, scientists, and conservationists were engaged with nomads, camel herders, hunters, and the Organization for Nomadic Peoples of Iran to understand issues facing not only cheetahs, but also people. Creative thinking allowed all stakeholders to make meaningful connections between saving the cheetah and the betterment of livelihoods in the cheetah's range. Much was discussed regarding the integration of local communities with mutually beneficial conservation initiatives. The prospects of bringing international emphasis to Iran through means such as research, training, and ecotourism were also explored. It was encouraging to see people participating at multiple levels, and in spite of language differences, the translation was clear: no one can single-handedly save the Iranian cheetah without the interconnected cooperation of all faces seated around the table.

A broad spectrum of "people issues" surfaced during the length of the workshop, but fundamentally all parties agreed the Iranian cheetah is in crisis and its conservation is an urgent matter that will require a variety of essential elements. Continued planning and information sharing must occur with an understanding that there must be patience regarding expectations from all sides. Realistically, all problems are not going to be solved and any management program will take time. Saving the last Asian cheetahs is not an impossible task, but it will require mutual cooperation and respect.

Iranian cheetahs live in a harsh terrain with a very small prey base of antelope, hare, and wild sheep. The nomads and camel herders felt that conservationists must address the poaching and illegal hunting that is wiping out an already limited population of prey species. Additionally, overgrazing by livestock in the reserves has eliminated much of the vegetation the cheetah's prey rely on. Therefore, adaptive livestock and wildlife management also play an essential role in conserving cheetah. Livestock undoubtedly needs to be removed from the core areas where the cheetah and its prey are struggling to survive. Simultaneously, methods of compensating people need to be identified and put in place. Without sustainable management for livestock and wildlife, the cheetah may not have a fighting chance.

The data gathered thus far played a crucial role in the discussions and planning that took place at the recent workshop. More information is needed, however, and the collection of data is a slow process. Fortunately, enough information was available to spark interest across diverse communities, and people are on the right track. Now more than ever, we know what information is needed to assist conservation efforts. The most difficult obstacles include finding the financial and human resources to obtain such information.

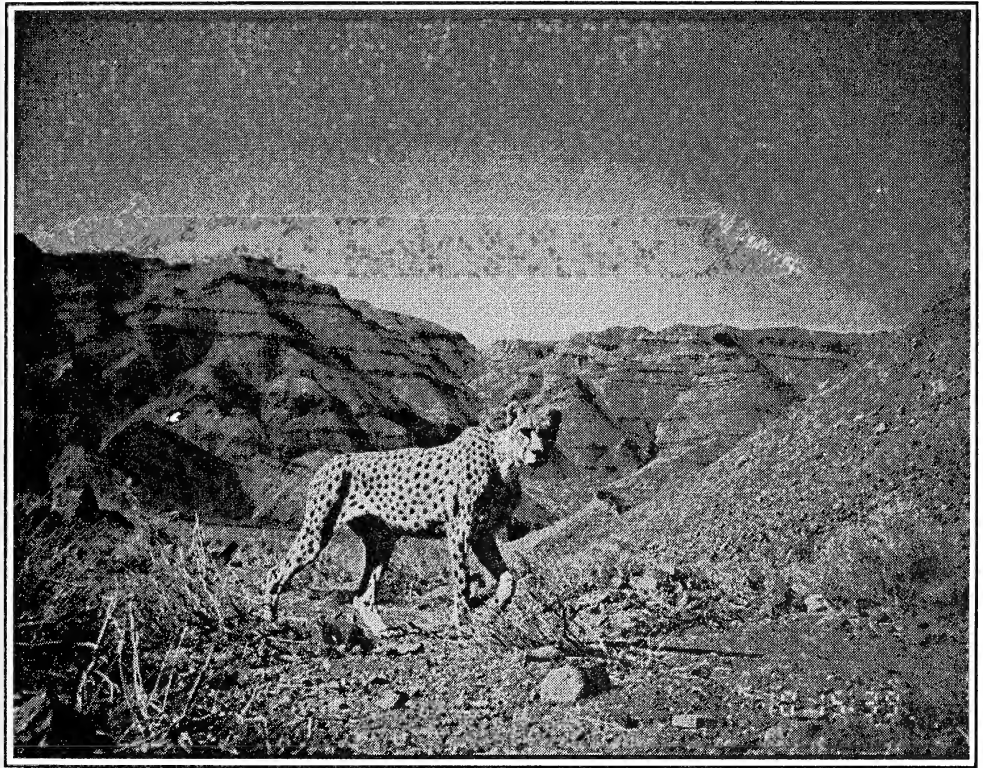
How many cheetahs remain in Iran? How widespread is the population? Where can cheetahs be found? Rare sightings have resulted in limited information, but future radio tracking initiatives could provide more definitive data. The WCS will likely conduct these vital studies, but proper protocols must be in place to ensure that accurate samples are obtained. In-depth range studies will provide CCF and its partners with the insights needed to take conservation planning to the next level.

Although this was only CCF's second trip to Iran, much has been learned since the last visit. The International Workshop on the Conservation of the Asiatic Cheetah was a fundamental step in the long road ahead for this isolated population.

International recommendations include the following:

- The Iranian cheetah is facing a crisis; but we must have patience with each other;
- There needs to be continued planning, with expectations; management takes time and strategies are necessary;
- We won't solve all the problems;
- The situation is urgent, we need to keep research going and must monitor actions;
- Critical actions need to be taken including understanding the impacts of hunting and gather data on hunting;
- Information must be shared so we all can better co-manage. No weapon or tool is held back;
- Important to map prey and rangelands;
- It is key to clear core areas for wild ungulates and cheetahs of livestock and humans, and understand where the core areas are;
- There is a need to understand the potential role in disease of wildlife and livestock and domestic dogs and cats; and understand the potential threats of disease;

- Adaptive management needs to be developed in areas around protected areas and the stakeholders must be monitored in the process;
- The needs of the people who are losing livestock must be acknowledged and schemes need to be developed which may include compensation;
- There is a lot of regionally and international knowledge available;
- There is a need for good cooperation and respect which will be the cornerstone of success.



Cheetah from Naibandand Wildlife Refuge
(photo courtesy of CCF)

Cheetah Fast Facts

- The cheetah originated over 4 million years ago in the region now occupied by Texas, Nevada and Wyoming. The last Ice Age, approximately 10,000 years ago, wiped out all the cheetahs in North America, Europe and a large majority in Asia and Africa. The cheetah is so different from other cats, it has its own genus, *Acinonyx*, and is the only living member of this genus.

The International Cheetah Studbook

*By Laurie Marker, PhD.
Founder/Executive Director
Cheetah Conservation Fund, Namibia*

The International Cheetah Studbook has the purpose of registering all cheetah in the world held in both zoological and private facilities, and providing information about existing animals by publishing the studbook contents enabling the creation of the preconditions for selecting breeding animals. The first edition of the International Cheetah Studbook was published in 1988. The 2002 International Cheetah Studbook is the 12th edition and includes all cheetahs known to be alive as of 31 December 2002 and combines all information available for the period 1 January, 2002 to 31 December, 2002 (Marker 2004).

The International Studbook has added captive animals around the world. In its first edition, the Studbook included wild-caught and captive-born animals, which were alive in 1980 and after, as well as founders with live offspring from 1980 and earlier. Over the years, more historic data from facilities has been collected and recorded in the Studbook. Each registered animal has a studbook card.

Each Studbook is published in a similar format including several sections for easy use and includes the following sections: Introduction of the population (Section A); major changes in the captive population from 1 January through 31 December of a given year (Section B); a summary of the captive population of cheetah, by Studbook number, at individual facilities as of 31 December of each year (Section C); all additions during the given year (Section D), that year's births (Section E); that year's deaths (Section F); and transfers during that year (Section G). Section F is an additional sub-section titled "Assumed dead". These animals have not been reported dead, but have been removed by the Studbook Keeper as it is assumed they are dead. Unfortunately, the Studbook Keeper has no recent information on them. Section H is a Studbook listing of all live animals as of December 31 of each that year, and Section I is a complete Studbook through 31 December of the year. A CD version of the Studbook is mailed to each facility holding cheetahs. The International Cheetah Studbook comes out at least a year past. The 2003 and 2004 Studbook are currently being processed.

The data in the Studbook has been computerized using the International Species Inventory System's (ISIS) Sparks Studbook Program. The information is compiled from various sources: Bi-annual questionnaires sent to all facilities holding cheetah; International Species Inventory System (ISIS); and importantly, personal communications. Excellent cooperation has been obtained from most facilities, and it is hoped that the data is accurate and complete. The Cheetah Studbook Keeper makes entries based on reported evidence and must assume that all information received from breeders is correct. Owners and holders of cheetahs are urged to check the Studbook for accuracy and if there are any discrepancies, the Studbook Keeper would appreciate notification.

2002 International Studbook Data

The international cheetah captive population on 31 December 2002 was 1,340 (695,644.1) animals in 241 facilities in 51 countries. The captive population of cheetahs live in eight geographical regions. Figure 1 shows the percentage of cheetah living in these regions as of the end of 2002. Table 1 is a breakdown of the eight regions by country and includes the number of facilities and the number of cheetah in each country for 2002. In addition, 43 cheetahs are found in unknown locations (primarily sales to game dealers where the final destination was not submitted to the Studbook Keeper).

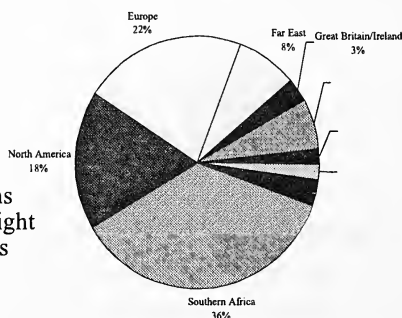


Figure 1. 2002 Captive Cheetah Population by Region - 1,340 Animals

Table 1 - 2002 - Regional Groupings

	Facilities	Total	M	F	U
<u>Southern Africa</u>					
Botswana	1	2	2	0	0
Namibia	28	174	92	82	0
South Africa	13	297	149	148	0
Zimbabwe	1	9	5	4	0
2002 - 4 countries, 43 facilities, 482 (248.234.0)					
<u>North America</u>					
Canada	4	23	9	14	0
United States	56	212	108	104	0
2002 - 2 countries, 60 facilities, 235 (117.118.0)					
<u>Europe</u>					
Austria	5	15	9	6	0
Belgium	4	13	5	8	0
Bulgaria	1	2	2	0	0
Czech Republic	5	23	10	13	0
Denmark	1	3	1	2	0
France	13	60	32	28	0
Germany	20	65	34	30	1
Italy	2	5	2	3	0
Netherlands	6	52	31	21	0
Poland	4	10	7	3	0
Portugal	3	5	2	3	0
Russia	1	8	3	5	0
Spain	3	7	3	4	0
Sweden	2	9	6	3	0
Switzerland	4	13	8	5	0
Uzbekistan	2	2	0	2	0
2002 - 16 countries, 76 facilities, 292 (155.136.1)					
<u>Far East</u>					
Burma	1	2	1	1	0
China	1	6	2	4	0
Indonesia	2	10	6	4	0
Japan	8	47	28	19	0
Malaysia	1	3	2	1	0
Singapore	1	10	5	5	0
Sri Lanka	1	2	0	2	0
Thailand	3	26	10	16	0
2002 - 8 countries, 18 facilities, 106 (54.52.0)					
<u>Great Britain/Ireland</u>					
England	9	29	15	14	0
Scotland	1	1	1	0	0
Northern Ireland	1	3	2	1	0
Ireland	2	11	6	5	0
2002 - 4 countries, 13 facilities, 44 (24.20.0)					
<u>N/E Africa/Middle East/India</u>					
Ethiopia	1	1	1	0	0
Israel	2	4	4	0	0
Jordan	1	2	1	1	0
Kenya	4	8	2	6	0
Morocco	1	2	1	1	0
Qatar	2	2	1	1	0
Saudi Arabia	1	5	3	2	0
Tunisia	1	3	2	1	0
United Arab Emirates	3	56	32	24	0
Dubai	1	2	2	0	0
2002 - 10 countries, 17 facilities, 85 (49.36.0)					
<u>Central and South America</u>					
Argentina	1	3	2	1	0
Brazil	2	3	1	2	0
Chile	1	2	1	1	0
Cuba	1	1	1	0	0
Mexico	3	18	7	11	0
2002 - 5 countries, 8 facilities, 27 (12.15.0)					
<u>Australia/New Zealand</u>					
Australia	4	14	6	8	0
New Zealand	3	12	8	4	0
2002 - 2 countries, 7 facilities, 26 (14.12.0)					
<u>Other</u>					
Unknown location	43	22	21	0	
2002 Total - 51 countries, 241 facilities, 1340 (695.644.1)					

2002 Total - 51 countries, 241 facilities, 1340 (695.644.1)

From January 1, 2002 to 31 December 2002, 296 new animals were registered. These additions include historical information on 101 animals previously registered as T-numbers, newly imported wild-caught animals, and births during this period. One litter born at Munster in 2001 was registered in 2002. Of the new additions, 50 (20.30.0) animals were wild caught. Of these animals, 44 (19.25.0) went to two facilities in Namibia. Three (0.3.0) cheetahs were caught in South Africa and went to one facility. One (0.1.0) cheetah apparently from Somalia went to a facility in the United Arab Emirates. One cheetah hand-raised in Kenya was recorded as being owned privately.

2002 STUDBOOK INFORMATION

The captive cheetah population on December 31, 2002 was 1340 (695.644.1) animals in 241 facilities in 51 countries. Of the 1340 animals, 69% or 926 (497.429.0) are captive-born and 28% or 372 (179.193.0) are wild born. These figures shows a decrease by 42 animals in the number of captive-born animals in the population compared to 2001. The number of wild-born animals also decreased by 36 animals compared to the population of wild-born animals in 2001.

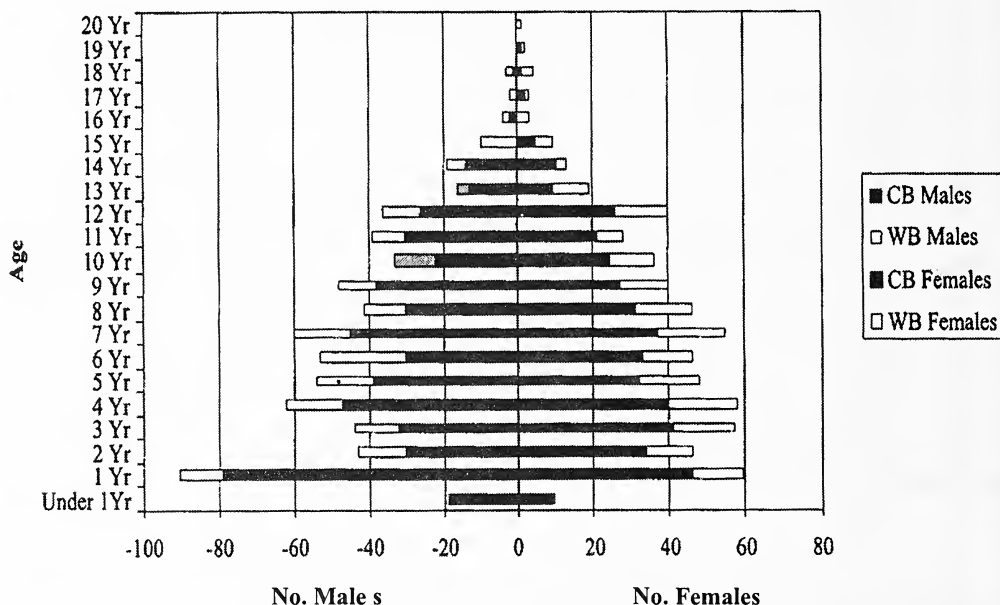


Figure 2. Age/Sex Structure of the 2002 Captive Cheetah Population for Wild-Born (WB) and Captive Born (CB). (Of these live cheetah, 1 is over 20 years of age and is believed to be a non-reported death).

Successful parentage was reported in 2002 with animals as young as two years old and as old as 15 years. The majority of successful breeding for both sexes occurs between three and 10 years of age. The data are relevant in assessing the age structure of the 2002 population. As shown in Figure 2, 53% or 712 animals (362.350) of the 2002 population are within the prime breeding age bracket (>3-<10 years of age). Of the animals in this age bracket, 34% or 210 (101.109) are wild born. The percentage of sub-adult animals (0-<3 years of age) is 20% or 266 (152.114) animals, of which 18%, 49 (24.25) animals are wild-born. Twenty four percent or 320 (162.158) animals are older than the usual breeding age (>10) of which 35% or 113 (54.59) are wild-born.

During 2002, 118 (71.41.6) cubs were born in 43 litters in 15 facilities in nine countries. Table 3 lists these litters of cubs and facilities. These births represent a decrease in productivity from 2001 when 137 cubs were born. Of the 118 cubs born, 24 (10.9.5) died under one month of age, which represents a 20% infant mortality. Five (2.3.0) cubs died between one month and six months of age.

Total cub deaths less than six month of age were 29 (12.12.5), which represents a 25% cub mortality, much the same as in 2001.

Table 3 – 2002 Births by Facility

FACILITIES	NO. LITTERS	NO. CUBS	NO.CUB DEATHS UNDER A MONTH	NO BREEDING M/F
Bogor	1	1 (0.1.0)	0 (0.0.0)	1.1
Cincinnati	1	2 (1.1.0)	1 (0.1.0)	1.1
Dvurkralove	3	6 (2.3.1)	2 (0.1.1)	2.2
Fontaine	1	5 (2.3.0)	1 (0.1.0)	1.1
Fossilrim	1	3 (2.1.0)	0 (0.0.0)	1.1
Hilvarenb	1	3 (2.1.0)	0 (0.0.0)	1.1
Hoedspruit	6	17 (7.7.3)	3 (0.0.3)	5.6
Luther	1	4 (2.2.0)	0 (0.0.0)	1.1
Munster	1	5 (3.1.1)	1 (1.0.0)	1.1
Oudtshoorn	5	9 (6.3.0)	3 (2.1.0)	3.4
Peaugres	7	19 (13.5.1)	12 (7.4.1)	3.4
Pret DW	11	34 (26.8.0)	0 (0.0.0)	6.11
Sharjah	2	3 (2.1.0)	0 (0.0.0)	2.2
*Singapore	1	4 (2.2.0)	0 (0.0.0)	1.1
Wass BR C	1	3 (1.2.0)	1 (0.1.0)	1.1
15 FACILITIES	43	118(71.41.6)	24 (10.9.5)	30.38

*Indicates first time breeding success

On a facility basis, 15 of the 241 facilities that held cheetah in 2002 had reproductive success. As shown in Table 3, 14 of those facilities had previous reproductive success, and one of the facilities had success for the first time in 2002. There were 30 males and 38 females that were reproductively active during the year. The age distribution of successful breeders in 2002 is presented in Figure 3, and the age distribution of all breeding animals alive at the end of 2002 is presented in Figure 4. This data is relevant in assessing the age structure of the 2002 population. At the end of 2002 there were 164 (73.91) proven breeders alive in the captive population. During 2002, only 68 animals, 4.7 % of the captive population successfully bred and 11% of these (18) were wild-caught animals.

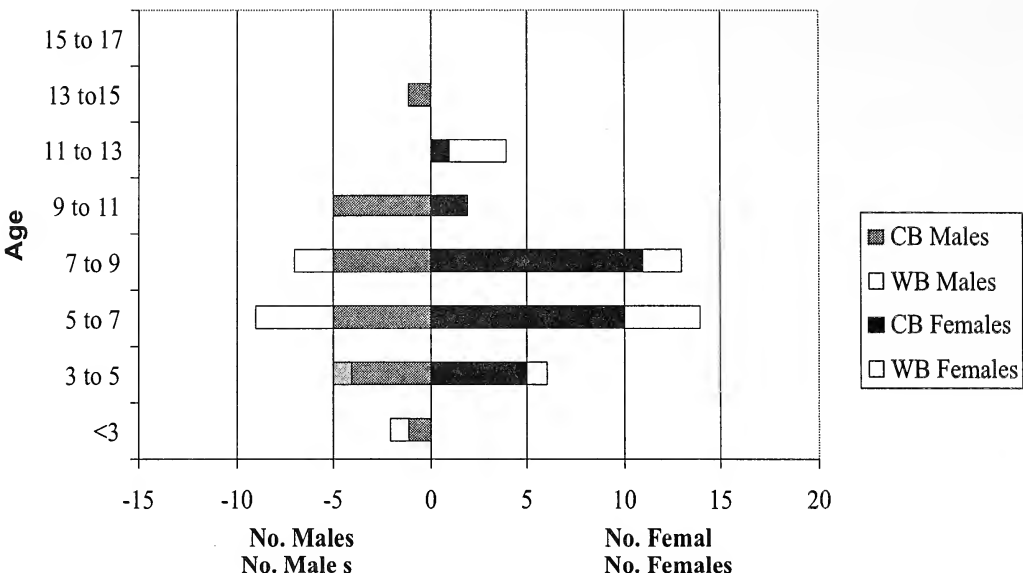


Figure 3. Age Distribution of Animals that Successfully Reproduced in 2002

Of the 1340 cheetahs alive in the 2002 population, 130 animals are proven breeders or animals that have breed at least once. This number permits the computation of the effective breeding size (N_e) for the 2002 population using the formula:

$$N_e = \frac{4 \times M \times F}{M + F} = 67$$

Where M is the number of breeding males and F is the number of breeding females, this value (N_e) is equivalent to 5% of the captive population.

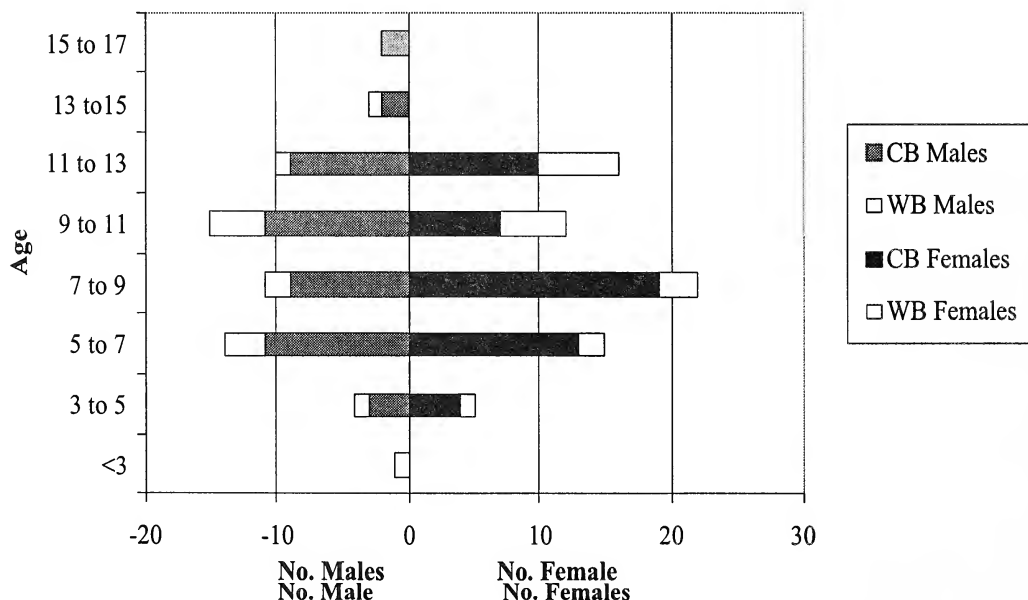


Figure 4. Age Distribution of Proven Breeders Alive as of 31 December 2002

Deaths reported in 2002 totalled 122, including cub deaths. Figure 5 shows the age at death of captive-born and wild-caught cheetah by sex in 2002. Of the animals that died, 34% or 41 animals were within the prime breeding age group ($\geq 3 \leq 10$ years of age); 39% or 48 animals were under three years of age, of which 79% or 38 were under one year old; and 27% or 33 were over 10 years of age.

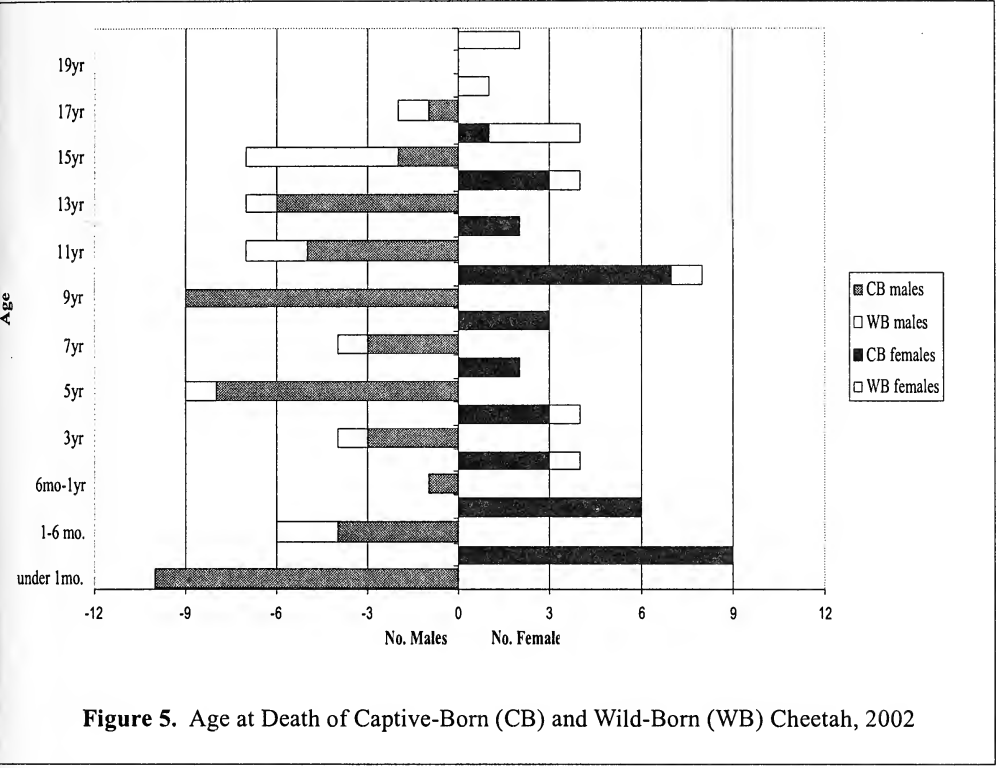


Figure 5. Age at Death of Captive-Born (CB) and Wild-Born (WB) Cheetah, 2002

Of the 118 (71.41.6) cubs born, 24 (10.9.5) died under one month of age, which represents a 20% infant mortality. Five (2.3.0) cubs died between one month and six months of age. Total cub deaths fewer than six months of age was 29 (12.12.5), which represents a 25% cub mortality, much the same as the previous year.

During 2002, 78 known facilities transferred animals either into or out of their facilities. Forty-one facilities transferred 90 (51.39) cheetahs to 55 facilities. There are 13 new facilities holding cheetah, and 28 facilities that are no longer holding cheetah. Many of the facilities removed are the ones holding cheetahs assumed dead due to their age. Unfortunately, no new information was received on these animals. Since the end of 2001, there has been a decrease of 36 animals in the world's captive cheetah population.

Reference

Marker, L. 2004. 2002 International Cheetah Studbook. Cheetah Conservation Fund, Otjiwarongo, Namibia.

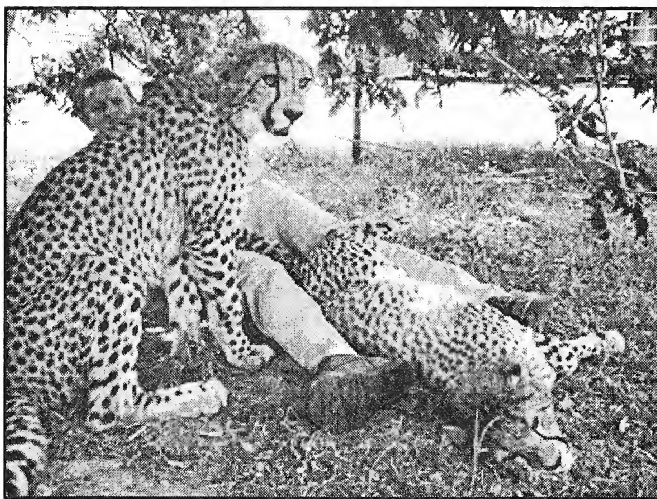
Bonding with Mother-Reared Cheetahs

By Louis Dorfman, Animal Behaviorist
International Exotic Feline Sanctuary
Boyd, Texas
www.bigcat.org

We received two cheetah cubs (*Acinonyx jubatus*), a male and female, when they were weaned from their mother at four months of age. They had very limited contact with humans prior to their being weaned. Since we are a sanctuary and our mission is to give our resident cats the best possible quality of life in captivity, we embarked on a program to acclimate these cubs to human contact in order to alleviate the stress that would otherwise be caused by human proximity in the course of their care.

We were mindful of the fact that exotic felines raised by their mother have no instinctual or acquired dependency on humans and therefore consider humans a source of danger or agitation. We also realized that cheetahs would be more apprehensive than some of the other exotic cats in a similar circumstance, as cheetahs are not the "top of the food chain" and therefore have instinctual defensive mechanisms that are not necessarily present in lions, tigers, or leopards.

Therefore, the degree of apprehension by the cheetahs towards humans would be heightened, as compared to larger species of exotic felines. Accordingly, the human contact was commenced with great care to be a non-threatening and supportive influence in the cats' environment. This was done by quietly entering the habitat and sitting or standing at a sufficient distance from the cats to give



Louis Dorfman with 1.1 cheetah at the International Feline Sanctuary in Boyd, TX. (photo from IFS)

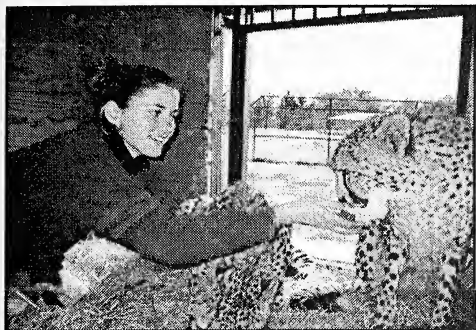
them assurance that they would not be approached or bothered by the human(s). In addition, we would move very slowly, talk very reassuringly and softly, and react to any indication of nervousness on the part of the cat by moving slowly away.

Initially, we would sit near the cheetahs at a distance of around 8-10 feet, moving slowly closer to them as they became more comfortable with our presence. Usually, after a period of time that varied from day to day, we would end up close enough to scratch or stroke their neck, being careful to only do it for short periods to alleviate concerns about aggravating the cheetahs in any way.

Our program of contact initially involved myself, my assistant, our executive director, and several interns and volunteers. Within a month or so, it became apparent that the interns and volunteers were not a positive influence on the cheetahs, even though they stringently followed the guidelines for interaction put forth. Our female cheetah showed defensive/aggressive movements several times towards several individuals. At that point, contact was restricted to my assistants, our executive director, and myself.

We began feeding the cheetahs while sitting next to their food, and soon they enjoyed eating out of our hand. At the time of this writing, they seem to prefer to eat out of our hand to eating from their bowl, as they will still sit up and look at us waiting for a handful of food to be presented. They are

now 18 months old. While feeding them, we occasionally stroke their neck or head; being careful not to do it to the degree it becomes aggravating or bothersome to the cats, but conditions them to the association between food and affection.



After feeding, the cheetahs generally walk up to a hill, which we built in their habitat, from which they can see the surrounding territory more easily. We will follow them and sit at distance of about six feet from them, usually waiting for an indication from them of a desire to be closer before closing that gap or touching them in any way.

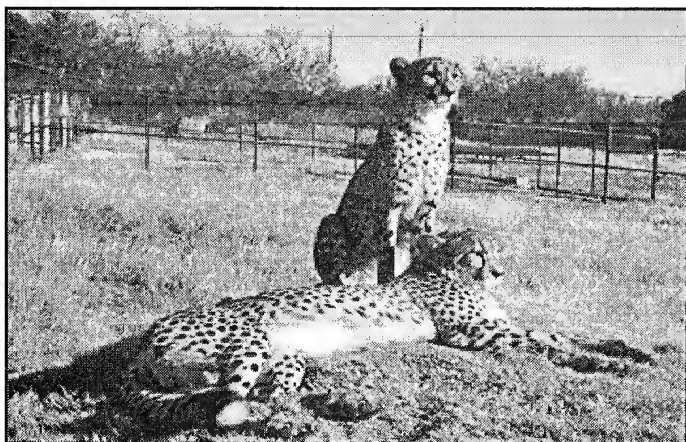
In the warm summer days, the cheetahs usually lie under a clump of tall bushes. We lie with them at a distance that makes them comfortable; usually it begins at around six feet and incrementally becomes closer to the point where we occasionally stroke them. There are days they don't wish to be touched, and there are days where they will come over for a quick scratch or rub. Usually the female is the more affectionate of the two, but I believe that is just an individual personality difference rather than a gender trait.

On occasion, they like to play with dog toys with us or chase a ball. Sometimes I run with a boat buoy on a rope, which they like to chase. We have a zip line rigged up in their habitat upon which a lure is attached, but we don't use it much only because the female has an apparently hereditary-based occasional weakness in one front leg.

Our cheetahs are very sensitive to any movement or change in the environment, even if the cause is hundreds of yards away. Both our cheetahs become alert and uncomfortable if someone comes out of our nutrition center about 200 yards away and moves too fast or if one of our vehicles moves a bit too fast even that far from them. We don't have any other exotic felines with that degree of sensitivity to movement or activity out of 65 different exotic felines.

However, our cheetahs seem to be quite happy and content. They lie upon their hill quite a lot surveying the surrounding territory, and they enjoy the human companionship when we sit with them under their trees or on their hill. They will occasionally play with their toys with us. They show no aggression whatsoever to any of the humans who enter their environment. If one of us comes a bit too close too soon, they will just remind the intruder with a slight hiss, and then, satisfied they have made their point, they will lie back and relax. We, of course, always honor their reminder and back off a few feet, which always puts them at ease. We feel we have done the best we can to make two mother-raised cheetahs comfortable in their captive environment and at ease with their human caregivers. They show great affection towards one another with no aggression at all, and the mornings and evenings are periods of joyful and playful interaction.

We have shown it is possible to develop a bond with mother-raised cheetahs, but it does take a great deal of time, patience, respect, and sensitivity towards the feelings of the cats. Because of their instinctual wariness, cheetahs are a bit harder to bond with than other species. I have bonded with mother-raised grown tigers more easily, but of course the danger is also much greater.



Cheetah Conservation Fund - Namibia to Kenya

By Mary Wykstra

Cheetah Conservation Fund - Kenya Representative

The cheetah (*Acinonyx jubatus*) has a long history with man. Today the cheetah is running a race for survival. The Cheetah Conservation Fund (CCF) relies on individuals and organizations for assistance in developing programs, which will ensure the survival of cheetah. Partnerships with Governmental and Non-Governmental organizations are necessary to secure assistance, support and cooperative efforts.

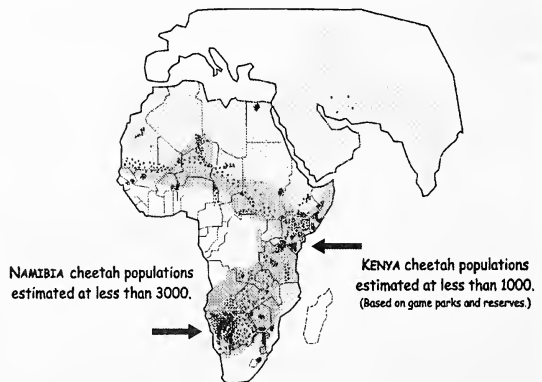
At two points in history cheetahs were reduced to very small numbers, resulting in a genetic bottleneck that today threatens the survival of the remaining cheetah populations. During the Ice Age, when many species became extinct, it is estimated that cheetah numbers were reduced to as few as 50 individuals. From that small population, the early ancestor of the cheetah populated most of what today is known as Europe, Asia and Africa. In the 1500's the cheetah was worshiped as symbols of speed and excellence cheetahs were used for sport and kept as royal pets. They were loved to near extinctions as many Czars, Caesars and other royalty removed cheetah cubs from the wild to tame them as pets or in a sport known as coursing.

While it is difficult to identify actual numbers, records and research calibrations have been able to estimate past and present cheetah numbers. In the 1900's it is estimated that as many as 100,000 cheetahs ranged across Africa, Asia and India. By 1975 the estimated cheetah population was reduced to around 30,000 in Africa, less than 500 in Iran and the Indian population was eradicated. This was a result of agricultural development, habitat destruction and an increasing intolerance for predators in areas of human settlement. Threats posed by cheetah were both real and perceived. An increased demand for meat products meant that predators threatened livestock numbers. As a large predator, the cheetah is often confused with the other spotted cats and becomes the "scape-cat" due to its diurnal behavior.

Through the 1980's the cheetah population was reduced even further with an estimated 15,000 cheetahs in Africa and as few as 100 in Iran. Although the rate of decline has slowed, the 2000 estimate was approximately 12,500 in Africa and 50 cheetahs in Iran. It is believed that the African numbers continue to decline in most of the range states. Eastern and southern Africa holds the strongest populations of cheetah today. Focused research provides us with information that can be used in management decisions on both *in-situ* and *ex-situ* conservation efforts.

At the current rate of decline the cheetah could become extinct in the next 20 years. With concentrated efforts in cheetah conservation in many of the countries with strongholds in cheetah numbers, it is hoped that cheetah numbers can stabilize and in some areas increase.

The Cheetah Conservation Fund (CCF) was founded in 1990 by Dr. Laurie Marker. From its base in Namibia, CCF aims to provide baseline data to understand the factors affecting cheetah survival on Namibian farmlands. Through CCF's scientifically-based studies, it assists in the development of policies and programs to sustain the current Namibian cheetah population. Successful programs can be used as models in developing similar programs in other cheetah range states. CCF works in cooperation with other researchers and organizations to develop systematic and scientific based approaches to cheetah conservation.



A systematic and scientific approach to conservation requires the ability to quantify threats and set priorities. It also allows for conservation actions to be guided by monitoring and evaluating programs. CCF's Namibia research programs provide information for conservation-based on population ecology and demographic studies which evaluate the role of the cheetah in its environment. Health, genetic, and reproductive programs use biomedical collections (blood, hair, skin, sperm...) to understand the overall health of the wild cheetah population.

The main question, "Is there really a decline of cheetah in Kenya?" was the reason for initiating a CCF project in Kenya (CCF-K). While there have been reports of reduced sightings since 1990, we do not know how accurate past estimates have been as they have mainly focused on populations inside the National Parks and used calibration. In all previously documented studies it is estimated that as much as 90% of cheetahs live outside of protected parks and reserves. For this reason the CCF Kenya project was launched in December 2001. Under the direction of Mary Wykstra and with Cosmas Wambua as a research assistant, the Kenya program has used the Namibia and other successful conservation programs as models in setting the groundwork for further studies. Kenya projects evaluate the ecology via game counts and have begun biomedical collections with the Kenya Wildlife Service (KWS). Kenya projects fit under the priorities set by the Global Cheetah Master Plan. Projects use Namibia as a model and work jointly with the KWS and East African Wildlife Society (EAWLS).

The KWS launched cheetah studies in the Masai Mara National Reserve in September 2001. While CCF participates in this program, the Mara project is a KWS-initiated and operated project. The aim of the Mara project was to evaluate the effect of tourism on cheetahs and to identify individual cheetahs for census purposes. Ongoing studies have identified 42 cheetahs using photographs. Cheetahs are often seen lying down upon the approach of tour vehicles, most of which drive off road for a better view of the cheetah. While tour drivers frequently view this behavior as a sign of

comfort, two-hour monitoring periods by researchers show signs of irritation (ear and tail twitching) by the cheetahs. Some cheetahs have learned to use the tour vehicles as a vantage point by climbing onto the roof for a better view of prey species; others walk along moving vehicles to get closer to the prey. Cheetahs have made some adaptations to their hunting behaviors by hunting during the early morning, late evening and lunch periods while tourists are in the lodges. Ongoing KWS projects continue to evaluate tourism impacts, but have added disease and predator interaction studies into their program.

The Kenya cheetah population was estimated to be between 500 and 1000 in the year 2000. This number is based on past studies and calibrations, however most studies were focused on habituated populations inside National Parks and reserves. CCF-K study focuses have been based on information from the past published studies. Initial studies focused in the Nakuru Wildlife Forum in the central Rift Valley. Conducting interviews with farmers and ground evaluation prompted an

extension of the study into the Machakos and Laikipia Wildlife Forums. While cheetah populations still exist in many locations identified in past studies, these populations are pocketed into groups of 10-50 cheetahs. Pocketed populations are separated by dense human populations in the form of villages and low wildlife-tolerant commercial and group ranches.

Most farmers recognize that predators play a critical role in the health of the ecosystem by maintaining balance. The cheetah makes a kill every 1-4 days and eats a small portion, leaving the remainder for the scavengers and decomposers. The cheetah has a 50% success rate in making its kills, but as many as 50% of the kills are stolen by other predators. Competition for prey and loss of cubs to other predators causes the cheetah to move over 1000 km sq home ranges. The cheetah is built for speed, thus is not strong enough to defend itself from competition.

CCF-K aims to reduce conflict between farmers and cheetahs by working with local communities to find effective solutions through evaluating predator problems, farmer attitudes and livestock losses. Research in prey distribution and changes in vegetation assist in developing solutions based on scientifically-based evaluation and monitoring. Cheetahs are capable of recovery when left on their own, however conservation is a complex social and political process. It is the people who live with wildlife on a daily basis who will ultimately save the cheetah. While government officials develop the policies, it is the people who make the decisions on land and wildlife management. In order to be effective, conservation must address human needs. As human populations continue to grow, so do the requirements for housing, food, health care and education.

Livestock farmers have developed techniques for protecting their animals from predators. Tolerance for predators involves integrated and mixed land and wildlife management and monitoring systems. Livestock loss is an economic and emotional issue. CCF-K's ability to listen and share information with farmers assists in data collection and in the decisions made by farm managers.

Due to perceived and actual threats, farmers have traditionally seen eradication as the only means of conflict resolution. This treats the symptom but not the cause. Today, alternative solutions must be identified and implemented to prevent the loss of biodiversity. CCF-K aims to increase awareness about cheetah and to share ways that farmers can improve livestock management to allow them to live peacefully with the cheetah. Improved livestock management includes good herders, healthy guard animals, good recordkeeping, precautions during birthing times, and secure night holding. Using donkeys and specialized dog breeds (i.e. the Anatolian Shepherd as used in Namibia) are methods that are shared with Kenyan farmers.

Farmers rely on the land and livestock for survival, thus they frequently have the "if it pays- it stays" attitude. In order to increase tolerance for wildlife, today's conservationists must work with the land owners to develop alternative sources of income that supplement or replace traditional farming. These alternatives include ecotourism and guest farms which require large land plots in order to be successful. Hunting and sustainable utilization are other means of providing income for large commercial or group ranches with diverse habitats and a diversity of wildlife. New concepts in promoting wildlife-friendly products have been successful in many regions with wildlife and can be developed in Kenya. In promoting sustainability, predators can become a national treasure. In Otjiwarongo, the Namibia CCF base city, a sign now welcomes their visitors to "the Cheetah Capitol of the World."

CCF has focused its efforts in Wildlife Forums where free game movement is encouraged between farms and ranches. Forums manage wild game which provide a prey base and manage predators as a part of a healthy ecosystem. Forums emphasize sustainability through both consumptive and non-consumptive use. Ideas from established forums can be used in promoting conservation in group managed ranches. Human-carnivore co-existence is possible when human needs and local problems are addressed in programs that meet those needs. Step-by-step actions and education programs are essential in the development of successful education efforts.

Students and volunteers assist in all aspects of CCF work both in Namibia and in Kenya. In addition to assisting in farmer interviews and habitat monitoring, the volunteers also aid in education work. Education activities include tourism presentations, community meetings and school programs. Specific projects include "The Great Cheetah Census" requesting tourists and individuals to submit photographs to be included into the database for identifying the density of cheetah populations. "The Snap-A-Cheetah" project is distributing 500 one-time-use cameras to allow rural farmers and rangers the opportunity to photograph the animals and habitat where they report cheetah sightings. The Snap-A-Cheetah cameras will not likely provide individual ID photos, but they will aid us in identifying areas of high cheetah densities for future conservation work. In both of the above projects the awareness of the plight of the cheetah is promoted and shared within communities and social groups.

Community development includes promotion of conservation actions and crafts through CCF international connections. School presentations share information on the balance of nature and discuss human-wildlife conflict issues. Activity pages and teacher resource guides are left with the schools

so the recipients of the program can share what they learn with others. Teacher workshops are being developed. An art and creative writing contest was held with winning submissions available for a traveling display in the US, UK and Kenya.

Volunteers are the backbone of CCF, locally and internationally. Student attachments require college or university affiliation and a proposal that fits into the mission of CCF. Kenya students are required to fund the inclusion of a local student or intern to increase capacity building on a local level. Interns affiliated with colleges, zoos or universities assist in all aspects of CCF daily activities. General volunteers can also join CCF for a period of one week to three months. Many zoos encourage their staff to participate in *in-situ* activities and will support projects under which their staff is involved. CCF invites volunteers and students of all levels to join our efforts through fundraising activities and international volunteering.

CCF has a variety of international supporters. Specific Kenya-designated funds come from the following donors: CCF Namibia, Delamere Estates, East African Wildlife Society, Park East Tours/Origin Safaris, Unlimited Fun Safaris/Vintage Africa, Classic Expeditions/JH Safaris, Cleveland Metroparks Zoo, Cincinnati Zoo/Angel Fund, Susanne Garrison-Clise, Tulsa Zoo, Bay Foundation, Utah's Hogle Zoo, Utah Chapter AAZK, and other private donations.

For more information on Namibia and Kenya programs and on how individuals and institutions can assist, please contact CCF through www.cheetah.org<

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Volunteer Opportunities Available in Kenya

About Cheetah Conservation Fund-Kenya

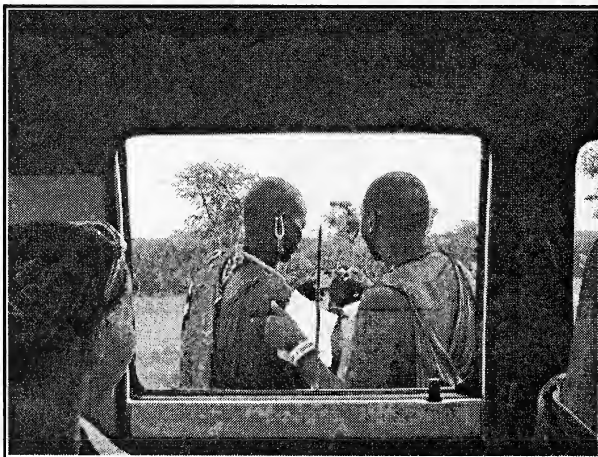
The Cheetah Conservation Fund has recently expanded its efforts in Kenya. Under the direction of Mary Wykstra, the Kenya project uses CCF Namibia and other successful cheetah (*Acinonyx jubatus*) programs as models to develop a conservation strategy, which supports the long-term survival of cheetahs in Kenya.

Informal observations have shown that in the last 15 years wildlife has been reduced dramatically within Kenya. However, little is known about the status of cheetah on Kenyan farmlands, as most of the research in this country has been limited to protected areas and game parks. Past data estimates cheetah numbers in Kenya at fewer than 1000. Conflicts with man and habitat loss appear to be the biggest threat facing cheetahs living outside protected areas. The Kenya project is working with the Kenyan Wildlife Service (KWS) and collaborating with other researchers and conservationists to determine cheetah numbers and sustainable habitat sites in Kenya.

CCFK is currently conducting a nationwide census, collaborating with KWS, East African Wildlife Society (EAWS) and other NGOs. The project aims are multiple: determine an estimated population status of cheetah; evaluate the conflict issues between farmers and cheetah; and determine suitable cheetah habitat within farmlands/community ranches. Information gathered from the census will be used to make informed decisions on cheetah conservation and wildlife conservation practices. Positive relationships built with CCFK and the people of Kenya will help facilitate conservation measures.

Education programs are a major component to the conservation work in Kenya, addressing predator/human conflict issues. They are concentrated in areas of cheetah sightings and reported livestock losses. While meeting with farmers to discuss livestock management practices, CCFK works to instill a new appreciation for the cheetah in farmers and school groups. This is done through classroom presentations and distribution of education materials.

Cheetah education is not always conducted through formal programs. The *Snap-a-Cheetah* project (developed to verify landowner/farmer interview census data and contribute to a picture database)



Kenyan farmers learn to use a single-use camera to document cheetah sightings and livestock damage.

also creates another education opportunity with farmers. Single-use cameras are being distributed to farmers throughout Kenya. They are asked to take pictures of any cheetahs they see, as well as any livestock damage that may have occurred. They may also take a few personal pictures for them to keep. The cameras generate interest within the community. The farmer becomes a "cheetah educator", explaining why he has the camera, about the cheetah census and why cheetahs are important to their community.

Human/predator conflict escalates as human populations rise and cheetah habitat is lost. CCFK works with

major landowners and wildlife forums (a coalition of private landowners within a district) to find alternative livestock and agricultural management practices that promote healthy predator co-

existence. Recently CCFK has begun to closely monitor some individual cheetahs living within a densely populated area that been in conflict with farmers, who have reported livestock loses. A tagging program has been initiated, telemetry collars have been placed on cheetahs in the southeastern part of the Machakos Wildlife Forum in southeast Kenya. CCFK and landowners are using this situation to better understand cheetah movements through farm and ranch land and to observe their behavior closely.

Accurate census counts are difficult with cheetah because they are elusive predators and hard to see. Leopards and other spotted cats are often identified as cheetahs. An evaluation of cheetah habitat is also essential. Understanding cheetah movements, demographics, and relationships with prey and humans will help accurately estimate the current status of cheetah in Kenya. Focusing on the interdependency of predators and prey with humans, CCFK seeks ways to ensure sustainable populations of cheetah to secure their long-term survival in Kenya.

Under the direction of Mary Wykstra, CCFK work is done with Kenyan employees Cosmas Wambua (Research Assistant) and Lamumba Matiso (Machakos Community Liaison Officer), in addition to the contribution of volunteers. In 2005 CCFK will be expanding efforts with the help of additional volunteers.

About the Volunteer Program

Volunteers are a vital competent of CCF programs. Volunteers work alongside CCF staff, contributing their expertise and time. CCF has had a long history with zoological institutions and we are eager to develop volunteer opportunities with zoo professionals. Utilizing zookeepers' skills and abilities as well their passion for conservation, will be an important addition to our conservation.

CCFK operations are based on the Soysambu ranch of the Delamere Estates. The farm is located approximately 2 1/2 hours northeast of Nairobi near Lake Nakuru National Park. Living quarters are comfortable, yet rustic. There is running water and generator-supplied electricity. However, because much of the work of CCFK is conducted in the field, time may be very limited at the ranch, and volunteers frequently find themselves staying in a tent.

Each volunteer experience is unique as CCFK work is varied. The itinerary is flexible to allow changes in the schedule to accommodate needs of partner organizations and landowners as well as to respond to cheetah inquiries. The following describes some of the work volunteers can anticipate:

Field Work-

- Tracking cheetahs - This work includes lots of walking through thick brush. When cheetahs are sighted be prepared to wait, observe and follow.
- Interviews with landowners (frequently in remote regions of Kenya) to determine cheetah presence, other predator sightings, game/ecosystem viability to sustain predators, and livestock conflict. Often the interviews are conducted with pastoral ranchers or small farm owners. Distribution of education materials and one-use cameras occurs as well. You may be asked to assist with collecting the data from the interviews and distributing the materials.

6 March 2005 - Sample Field Notes

Today we left Nakuru and drove to the Magadi region via Nairobi. We drove through many small towns and over some very bumpy roads. We drove over rolling hills and then down into the Great Rift Valley. Mary had warned us it would be warm, but I did not anticipate the lack of movement in the air and the dry dust that would make me feel as though I had been placed in a desiccant to be preserved. We continued on traveling further south, reaching very close to the Tanzania boarder. The houses became fewer in number and the distances between villages became greater. People were grazing their cattle and goats in the bright colored garb of the Massai, it is a beautiful contrast to the desert sand. Zebra, giraffe and antelope rested under the acacia trees taking a break from the mid-day sun. We have come to this area to conduct interviews with a group of Massai community ranch owners. We reached our destination, Shampole, after five hours of driving, to meet the man who will be our escort in the area for the next week. Yusuf was very excited to see us and show us the area he and his family have called home for many generations. He hopped in the truck and we

drove further in the bush to find a spot to set up camp that night. Because dusk was nearing, we needed to find a place soon. He led us to a spot near a group of manyatas (a traditional Massai dwelling made of sticks and mud surrounded by acacia branches). We are introduced along the way to many community members; most do not speak English or Swahili but speak Maa, the language of the Massai. As we set up camp, Yusof tells us that in the morning we will move our camp further in the bush. Scorpions scurry by, as we scramble to change out of our sandals and into shoes. We are fortunate to spend the night here, as the Massai are private people and do not often welcome visitors so close to their homes. We will fall asleep tonight to the sounds of the singing and dancing of the Maasai Moran, warriors who live in the bush. Tomorrow we will look for the cheetah.

- Game and livestock counts are conducted in the areas where interviews are done. You will be asked to identify the number of animals seen, how far away (in meters), species, and determine sex of animals if possible. It is recommended that you become familiar with the antelope, predator and large bird species before you come to Kenya.
- Vegetation density assays taken to determine the amount of vegetation in an area and if the area is suitable for cheetahs and prey species.

At the Farm-

- Computer work such as data entry, generating reports. It is recommended that you are familiar with computers and word processing software.
- Everyone staying at the farm (and in the field) is expected to take turns preparing dinner. You can anticipate foods similar to the US.
- Living area clean-up, field trip prep and gear repair.

Education Programs

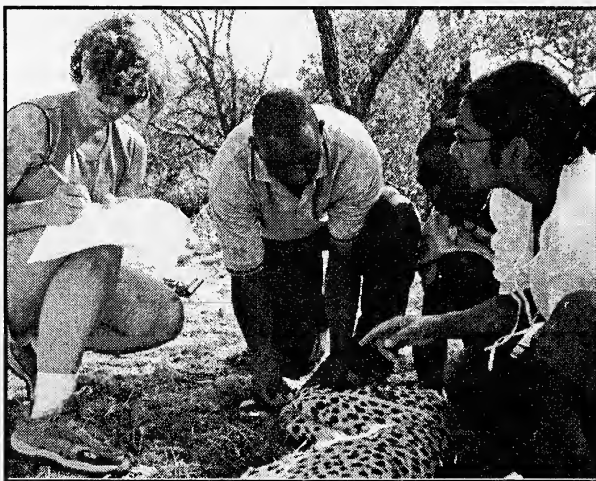
- Assist CCF staff with conducting school programs to educate children about cheetahs, including distributing materials and organizing activities.

Tourist Lectures

- Assist staff in giving presentations to tourists in the area, selling crafts, and answering questions about cheetahs.

Volunteers are asked to participate for a minimum of four weeks. This gives the volunteer time to adjust to the time change as well as familiarize them with living in Kenya and CCFK work. Participation fees are US\$300 per week. This fee covers food, housing, operating costs and a donation to the project. Travel to and from Kenya is the responsibility of the volunteer.

This is a great opportunity for animal care professionals to see and experience conservation issues that affect their charges. Volunteers will meet and get to know people living in conflict with cheetahs and better understand the complexity of these issues. In addition to observing wildlife in their wild habitat, volunteers will have the ability to contribute to first-hand in conserving cheetahs.



A CCF Volunteer records data as a cheetah is examined in preparation for tagging.

For more information about volunteering or receive an application contact:
 Liz Larsen, Animal Care Supervisor
 Utah's Hogle Zoo
llarsen@hoglezoo.org

Breeding Management Strategy for Cheetahs (*Acinonyx jubatus*) at the Smithsonian's National Zoological Park

By Jennifer Frank and Craig Saffoe, Animal Keepers
Smithsonian's National Zoological Park
Cheetah Conservation Station, Washington, DC

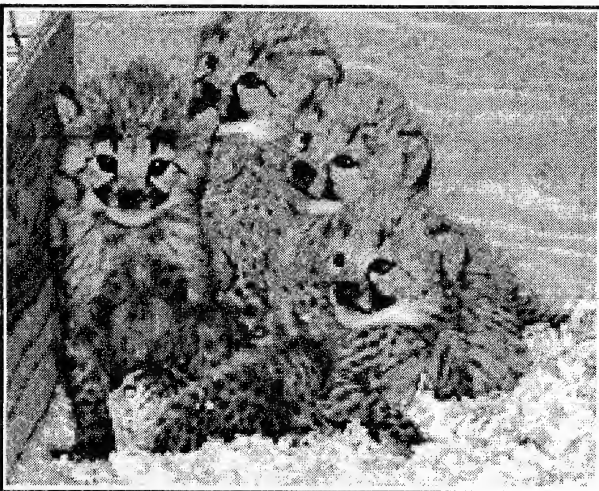
It is no shocking revelation to any animal keeper that cheetahs (*Acinonyx jubatus*) are very difficult to breed in captivity. Many cat species reproduce poorly in zoos, but cheetahs seem to have more challenges, ranging from poor genetic variability and gamete malformation to behavior nuances that complicate husbandry practices. At the Smithsonian's National Zoological Park (SNZP) we have been trying hard to overcome these obstacles and breed cheetahs. Although we cannot control their genetic situation we can manipulate our management to increase the potential for creating optimum breeding conditions.

In order to successfully explain how we manage our cats, it is necessary to describe how our yards and holding areas are set up. We have three cheetah exhibit yards that are visible to the visiting public. The largest yard (Yard 2) is 2,144 square meters, the neighboring yard (Yard 1) is 584 square meters, and the third yard (Yard 8) is 822 square meters. There are no visual barriers between Yards 1 and 2. Only a 2.1-meter high chain-link fence separates these yards so cats in either yard can have direct fence-to-fence contact with each other. Yards 1 and 8 are adjacent but separated by a fence and a four-foot wide patch of bamboo. Reed fencing attached to the fence in Yard 8 adds to the visual barrier. Because of the bamboo and reed fencing, the cats in Yards 1 and 8 have limited visual access to each other.

The off-exhibit holding area consists of a series of runways that connect to indoor housing (night houses) and outdoor holding yards. The night houses are eight individual adjoining rooms (the smallest is 1.75 meters x 3.5 meters while the largest is 2.3 meters x 3.5 meters). These rooms were designed primarily for short-term occupancy during severe weather, and can also be used to visually isolate cats from one another during breeding management. Lastly, there is an additional 349 square meters of space divided into eight outdoor holding yards for the cheetahs (see diagram of the NZP cheetah facility).

We have spent a considerable amount of time talking with keepers and managers at other cheetah breeding facilities and learning their breeding strategies. We have adjusted methods that have proven successful to fit our facility and hope that the information in this paper may prove beneficial in a similar manner to other institutions interested in breeding cheetahs. In 1999, the Species Survival Plan (SSP[®]) recommended that we breed cheetahs at SNZP. The process that we use to introduce an intended male and female for natural breeding is lengthy and difficult, but has resulted in nine successful copulations, one of which produced the first cheetah litter in SNZP's history (born November 23, 2004).

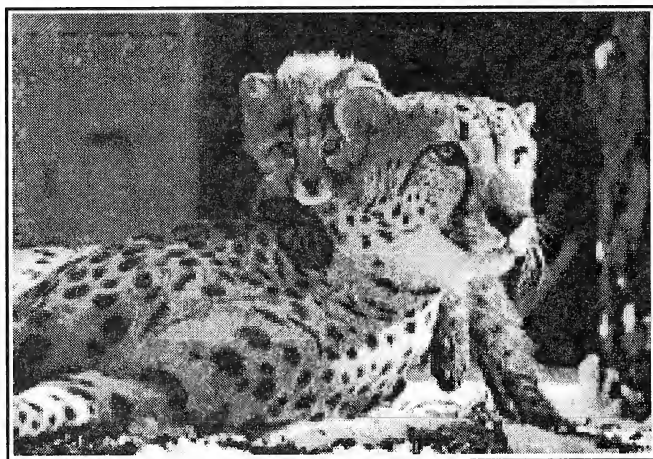
Males that were raised in coalitions live together, but we also house single males. All of our adult females are kept solitary in an attempt to repro-



First Cheetah Litter Born at NZP
(photo by Jessie Cohen, NZP photographer)

duce their natural social organization. We also make an effort to keep females as far apart from other females as possible due to the potential of estrus cycles being shut down (Wielebnowski et al., 2002). An important factor in breeding cheetahs is determining when a female is in estrus. Female cheetahs come into estrus roughly every 14 for a period of + / - two days (Brown et al., 2001). We conduct "investigations" to establish when a female is in estrus.

Investigations begin by moving the target female into Yard 1 and leaving her there for a minimum of two days. She is then moved into a night house where she is visually isolated from the other cats, particularly the males. A male or coalition of males is then given access to her empty yard to explore and his reactions are observed closely. The main responses we look for from the male are chirping, yelping, stuttering, running and an erection. If there is no response from the male within 30 minutes to an hour, he is moved out of her yard and another eligible male (one who is recommended by the SSP[®] to breed with that female) is moved into the yard. This process is continued until all eligible males have investigated the target female's yard. Investigations will be conducted for one month or until males show a response. If no males react to her within a month's time, then the possibility that she is not cycling needs to be explored. If any combination of the desired behaviors is observed, we assume that the female is cycling and continue with the next step of the breeding process.



Cub Hatima and mother Tumai at NZP

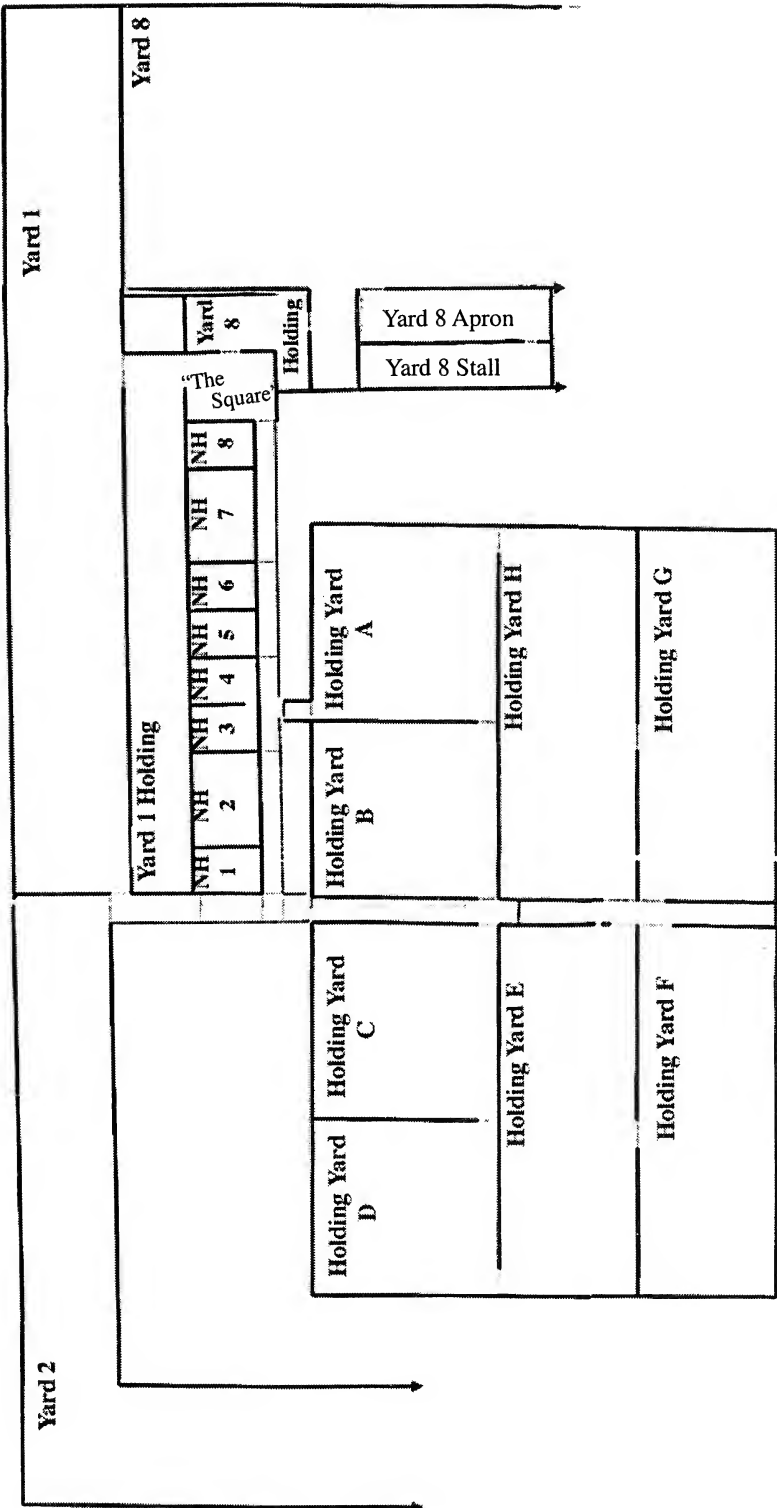
(photo by Jessie Cohen, NZP photographer)

In the next step, we shift the female into the adjacent Yard 2 so he can see her, and observe the reactions of both cats. Ideally, his behaviors should intensify and hers should include some combination of the following: tail flagging, rolling or head rubbing objects (particularly the fence near the male, allowing him to groom her). If she does not respond with any of these positive behaviors or avoids or acts aggressively towards the male, then the investigation with this specific male is discontinued and may be tried again the next day. A different male

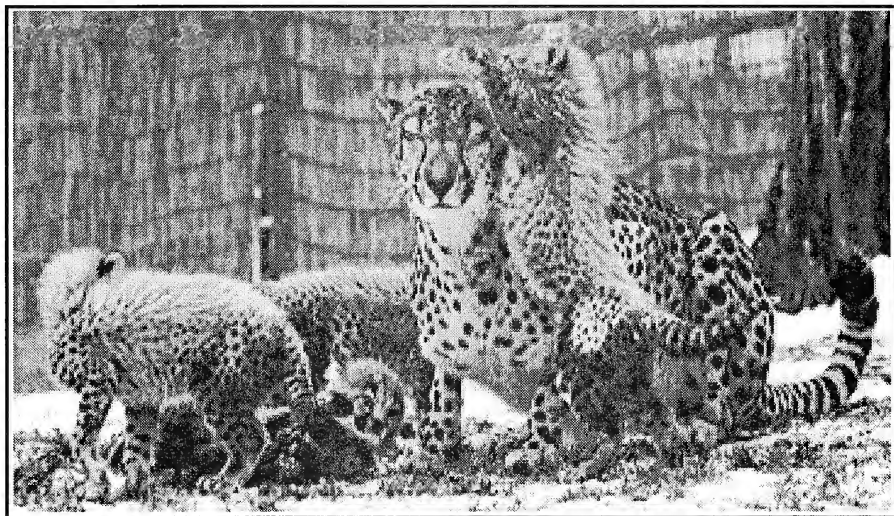
may be tried to see if she responds more favorably to him. If she responds positively to the male, she is shifted back into the night house or holding yards to prepare for a breeding introduction. Note that when she is shifted out of Yard 2 and is no longer visible to the male, his vocalizations and running should grow even more intense.

Based primarily on the temperament of the cats involved, keepers determine where the breeding introduction will take place. Normally we use either Yard 1 or the holding yards. If cats are introduced together in Yard 1, two keepers will be in the yard with them ready to intervene if they get overly aggressive. The advantage of Yard 1 is that it is large enough that the cats have space to move around freely even with keepers standing in the yard with them. The yard is small enough that it is relatively easy to separate cats in the case of an emergency. The biggest problem with using this yard is that cats are sometimes distracted by the presence of zoo visitors. The holding yards offer us tremendous flexibility and ease for separating cats that become too aggressive. However, there is very little room for cats to move freely and though they have privacy from the public, in this setting keepers are not able to move away from them as we can in Yard 1 and can easily end up being a big distraction. In either case the female is always put into the introduction area first and then the male is allowed in with her. This gives the female the opportunity to avoid him if she is not interested in breeding.

NZP Cheetah Facility



When the male is introduced to the female, keepers watch the body language of both cats carefully. Is the male being aggressive (approaching the female with his head down and ears back) or solicitive (approaching her with his head up and stuttering)? Is the female running from him or is she walking with the potential of going lordodic? Keepers need to be very aware that some aggression is normal, but must be able to identify when the aggression level is becoming dangerous. For keepers with less experience putting cats together, it is always better to err on the side of caution. If it becomes apparent (this is a judgment call that can only be made by the keepers involved in the introduction) that the cats have little interest in breeding, then they are separated. If a breeding takes place, then the animals are separated at the first opportunity.



Mother Tumai and her four cubs play in the snow at NZP
(photo by Jessie Cohen, NZP photographer)

To conclude that a breeding has occurred, we look for key behaviors. In all instances where we have seen intromission and consider the copulation successful, we have noted several specific behaviors. The copulation lasts about 30 – 45 seconds. The male exhibited a flehmen response and hissed immediately after the female threw him off. The female immediately started rolling vigorously from side to side. These behaviors have also been documented at other facilities that have successfully bred cheetahs.

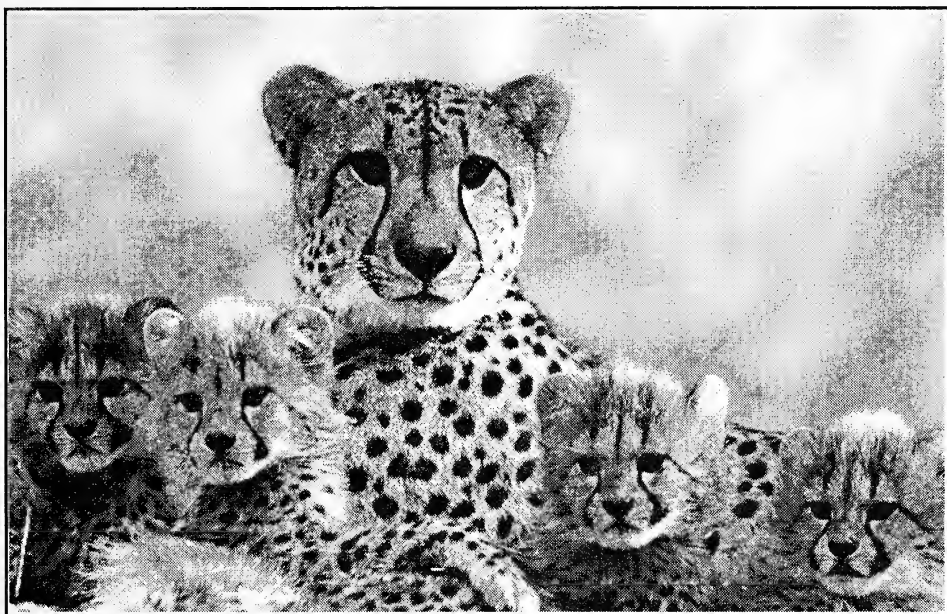
After the cheetahs have bred, we may attempt another breeding with the same pair of animals over the course of the next 24 hours. After that window we assume that the female is pregnant and we treat her as such, moving her to the maternity den and increasing her food amount



Cub Sanaa and four-year-old mother Tumai at NZP
(photo by Jessie Cohen, NZP photographer)

slightly every 30 days. It is not uncommon for cheetahs to go through false pregnancies after breeding. Since they are induced ovulators, when a female cheetah is bred and ovulation occurs, her body immediately goes into pregnancy mode. Her belly will get larger, she will begin to gain weight and in some cases even exhibit some maternal behavior. In a false pregnancy these changes cease abruptly 60 – 70 days after the breeding (Saffoe, 2005). In a true pregnancy they continue until she completes her three-month gestation.

Though we have had only one litter of cheetah cubs born at SNZP, we consider our breeding strategy successful. From 1999 to 2004 we had nine breedings. Six of these resulted in false pregnancies, all with females between the ages of seven and 12 years. The first time we implemented this strategy with a young female (four years old), she became pregnant and gave birth. This indicates that the biggest hurdle we were facing was the age of the females we were breeding. We are well aware that there are numerous factors that go into the success of breeding cheetahs at any facility. The strategy that we employ provides us with the optimum conditions by which to continue breeding these cats long into the future.



On 21 August 2004 Tumai, a four-year-old female, and Amadi, a 10-year-old male were introduced for breeding. After a 95-day gestation, Tumai gave birth to a litter of four healthy cubs on 23 November 2004. (photo by Jessie Cohen, NZP photographer, January 2005)

Cheetah Cub Fast Facts

- Cheetah cubs are born with long, grey fur. Some naturalists think that this mimics the Ratel (*Mellivora capensis*), a fierce relative of the badger that few animals dare attack.
- Cheetah cubs have a long mane on their neck and shoulders that disappears as they get older.

An African Opportunity with Cheetah Conservation Fund Namibia and Kenya

By

Kayla Grams, Former Volunteer at CCF
Biological Science Technician, U.S.G.S., Grand Junction, Colorado

The Namibia Experience

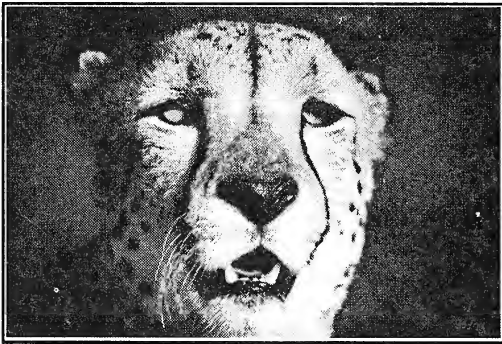
I had the opportunity to travel to Africa to work with Cheetah Conservation Fund (CCF). I quit my job and my friend Mary Wykstra and I traveled as volunteers, first to Madagascar and then to Namibia 1999-2000. We intended on staying three months in Namibia as that is all our visas would permit, however, we managed to stay five months to help with the completion of the Education Centre at CCF. This was a huge undertaking where we researched, developed and put together the Centre. The Education Centre was built so local and international visitors can learn and be educated about the plight of the cheetah (*Acinonyx jubatus*). Mary, Manda Friend, (Namibia) Graeme Wilson, (Namibia) and myself were the core people set to the task, however, the entire staff and volunteers

at CCF participated. Elena Chelysheva, (Russia) and Johann Burger, (Zimbabwe) were the artists creating incredible artistic displays. We became a close tight-knit group and worked well as a team. Even with the job at hand, we also participated in research activities and care-taking of the non-releasable cheetahs on the CCF farm.

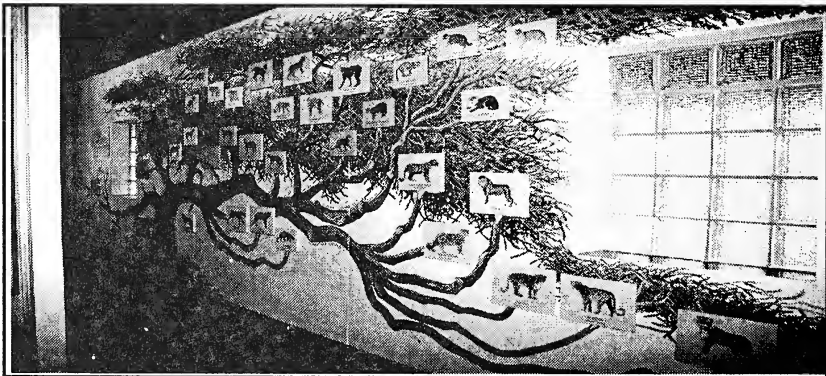
When we first arrived at CCF, they were still constructing the building. In the months to come, the Centre transformed itself into an incredible educational experience. There was a mad dash at the end as brick layers worked long hours, large graphic panels were put up,

and the finishing touches were made. The Centre was dedicated in July 2000 with a memorable ceremony including an appearance and ribbon cutting by Namibian President Sam Nujoma.

We developed four rooms consisting of the History of the Cheetah, Biology of the Cheetah, Ecology of Namibia's Cheetah Habitat; and the Future of the Cheetah. As you first walk into the centre, you see a phylogenetic tree which shows the ancestry and evolution of cats and where the cheetah fits into this. Then you immediately enter into the History Room.



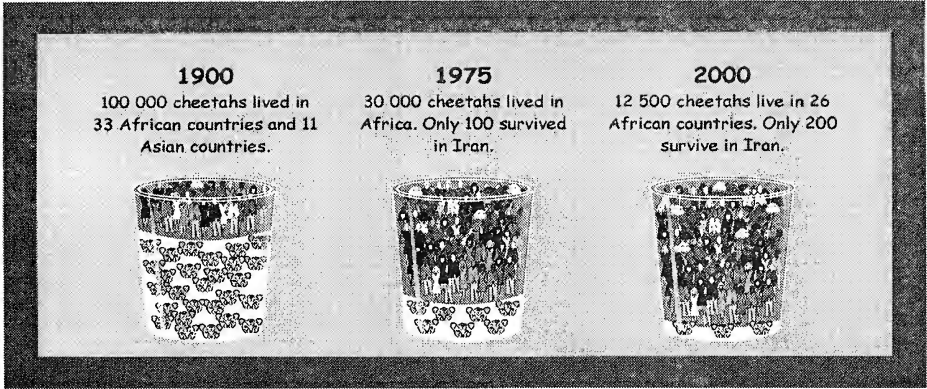
CCF Cheetah Ambassador "Chewbaaka"
(Photo by Kayla Grams)



Phylogenetic Tree in CCF's Education Centre (Photo by Kayla Grams)

The History Room

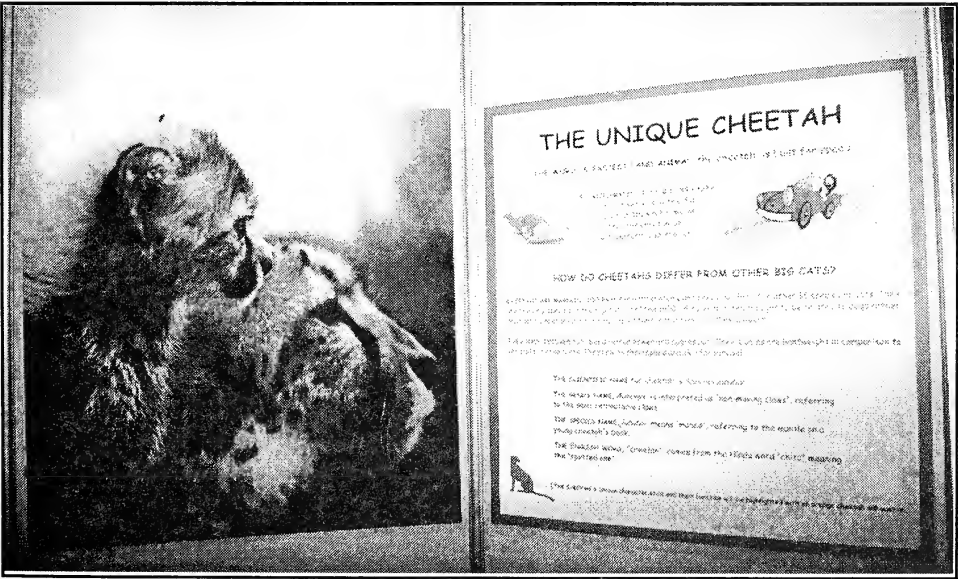
A walk through the History Room shows you the first cats, cheetah ancestors and briefly describes the genetic bottleneck they went through. Cheetahs have a significant symbolism to man. Since 1700 BC they were first tamed and used as hunting companions, and have been a large part of early history. Cheetahs were also used frequently in art. Unfortunately they are on the road to extinction. Namibia considers itself the cheetah capital of the world, having the largest population. In the future, there is still hope.



This Centre graphic shows the decline of the cheetah population over time. (Photo: CCF)

The Biology Room

The second room brings you to the Unique Cheetah and its biology. The fastest land animal takes you through its cycle of life, from birth to leaving the den, leaving their mother, and mating. This room gives more of a hands on approach to learning. In many places in Africa, cheetahs are mistaken as leopards. The cheetah is described from head to tail in various panels and hands on props. Each panel shows the importance of individual specialized body functions that makes them unique. Secrets to a successful hunt are described along with their behaviors and vocalizations. The last stage of their life is finding a mate and their eventual mortality.



This graphic panel discusses the things which make the cheetah unique. (Photo by Kayla Grams)

The Ecology Room

As you enter the Ecology Room there is an artificial tree and a trap. These are significant in Namibia where cheetah use trees, called “playtrees” as a means of communication by scent marking the trees. In order to “Trap a Cheetah”, cages may be placed at playtrees and surrounded by acacia branches. The urge to reach the tree is so strong that they walk through the trap. The information in this room describes Namibian biomes, parks and farming areas, the habitat, and where cheetahs live. Research has been ongoing through CCF to discover ranges and territories of Namibian cheetah. Understanding these animal movements will help them now and in the future. Bush Encroachment is one environmental threat facing Namibia’s cheetah where habitat may change over time. The cheetah’s prey and predator competition are important factors in their survival where predator control is a global issue. Namibian cheetahs live on commercial livestock farmlands and outside game reserves where all must deal with the cheetah. Management of land, livestock and wildlife is the key to the possible mission of saving the cheetah. CCF is the voice of the cheetah and has been working with farmers using Anatolian Shepards in their guard dog program, and working with conservancies to find solutions for both man and cheetah. Friendly farming practices are encouraged and CCF staff strive to work with farmers to create a better future for all.

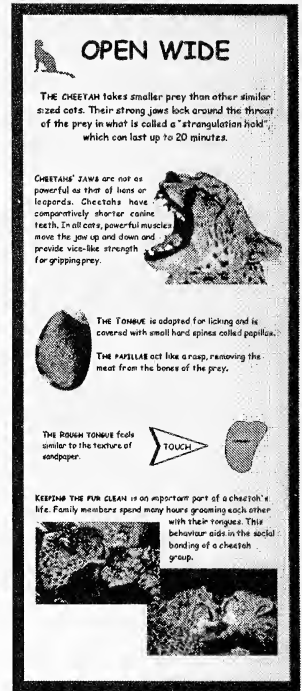
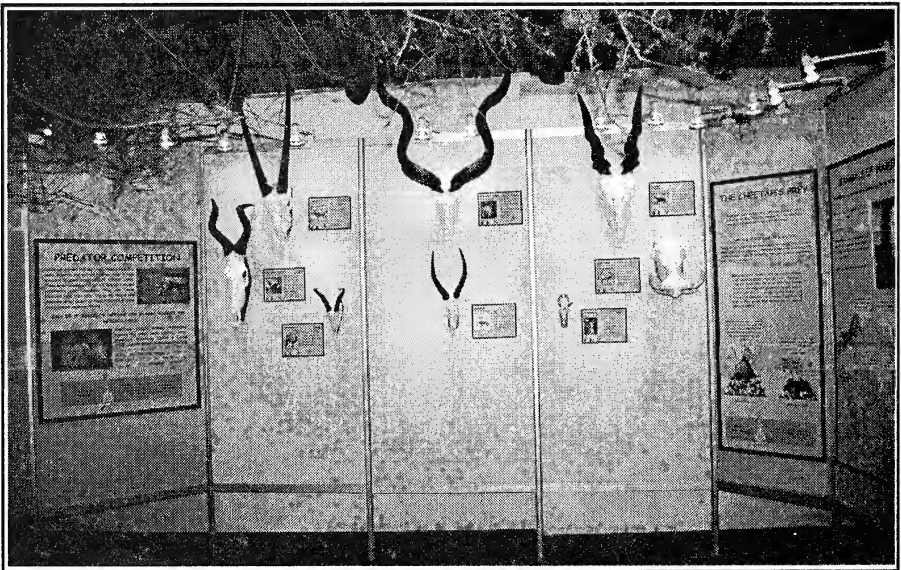


Photo by Kayla Grams



(Photo by Kayla Grams)

The Future Room

The Ecology Room blends with the room of the future. The role of zoos, teachers, schools and those who learn can help save the cheetah. Education and outreach are key to their future. Research is ongoing including human impact, population biology, health and reproduction and ecology. There are many voices out there willing to save this incredible animal. In the web of life it is hoped that

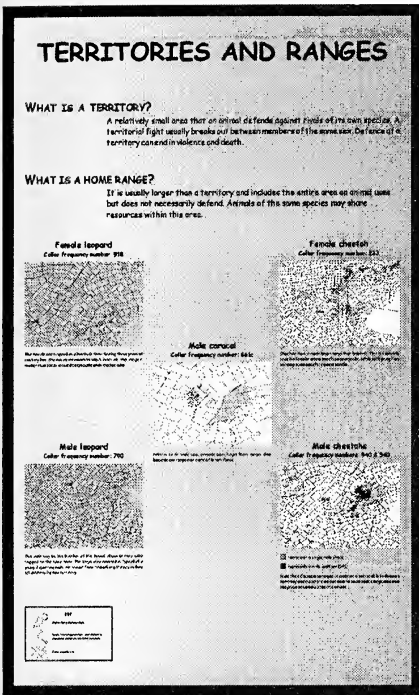


Photo: CCF

where farmers had trapped cheetah. We also enjoyed time on the farm watching Chewbaaka, Dr. Marker's hand-raised cheetah, run through a lure course. CCF Namibia is well worth the visit or even a chance to volunteer.

The Kenyan Experience

Mary Wykstra, who I traveled with to Namibia, headed back to Africa in 2001 to develop a Cheetah Conservation program in Kenya. Under the umbrella of Cheetah Conservation Fund the first three years she stayed on the Delamere Soysambu Farm to determine if this was a good area to reintroduce cheetah. It was determined that it was not a good place as there is too much human activity on and around the farm. I visited Mary in 2004 and helped out for two months. My experience here was much different than Namibia. Establishing a means to conserve wildlife from the ground up can be a difficult, frustrating and strenuous task at times. Much of Mary's time is spent talking to individuals and groups and making contacts to exchange ideas, establish

individuals, cooperative efforts, working with animals in their environment and working with captive animals will help cheetahs win the race for survival.

A classroom sits at the end of the Centre and opens up a window into the future of the cheetah. As you leave the centre "Open your Eyes" is the message at the Donor Board.

The Education Centre is not all we were involved in. There is a lot to do on the farm which is 30 minutes from Otjiwarongo, the nearest town. There are numerous cheetah that cannot be released back into the wild that are cared for on the farm. Having been involved in carcass feeding in the zoo, this was a treat to be able to feed just carcass food. If any medical work-ups were needed, we were all involved. We worked up the captive as well as the wild cheetah. We had an incredible learning experience with a hands-on opportunity to take measurements, draw blood, radio collar, ear tag and release them back into the wild. An experience I will never forget! We also worked on a leopard and caracal. Weekly surveys of radio collared cheetah were done and I had the opportunity to fly twice. I accompanied CCF staff on various occasions

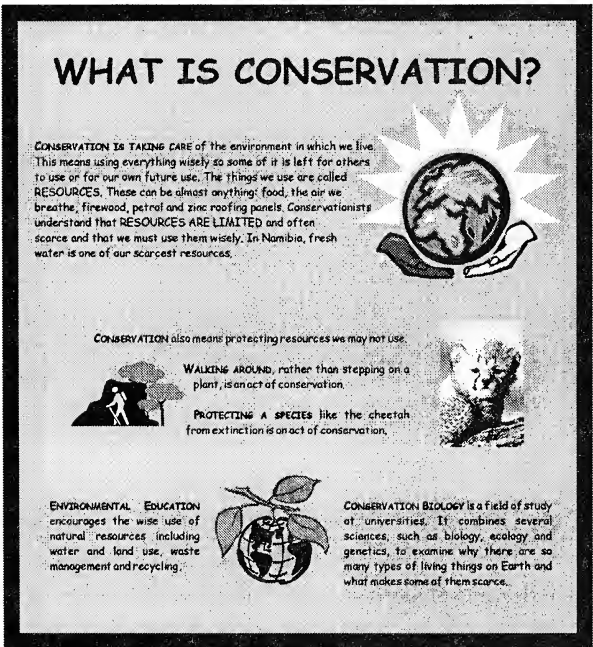


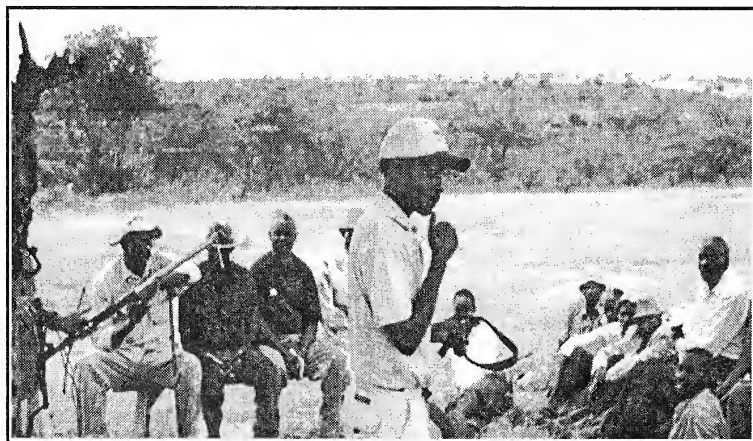
Photo: CCF

education programs, and discuss concerns with problem animals in hopes of finding solutions. It is not as easy as making a phone call, which is what Mary could do, however, what makes a huge difference is going out and meeting people and talking to them. Travel is required a lot of the time and the Kenyan roads are not something to be desired!

Mary and her research assistant Cosmas Wambua are currently working with a community near Machakos in which they are dealing with problem cheetahs. The land is quickly being snatched up and subdivided into small plots. Trees are cut down and there is no place for the wildlife to seek refuge, so they disperse into farm and community areas and wreak havoc. For a man who owns only nine goats, if three are killed, it is considered a huge loss as this is his livelihood. You cannot fault the man for wanting to kill the cheetah. The importance to the survival of the cheetah in Kenya is working with people, educating people and empowering them to find solutions for co-existing with the cheetah. This is not an easy task, but as I watched Mary in her work I could see there is hope. I met one man who once wanted to kill the cheetah, but is now able to watch them at a distance. With Mary and Cosmas's help, Lumumba Mutiso became educated regarding the cheetah and now wants to save this species. Lumumba has convinced his community that cheetahs should survive.



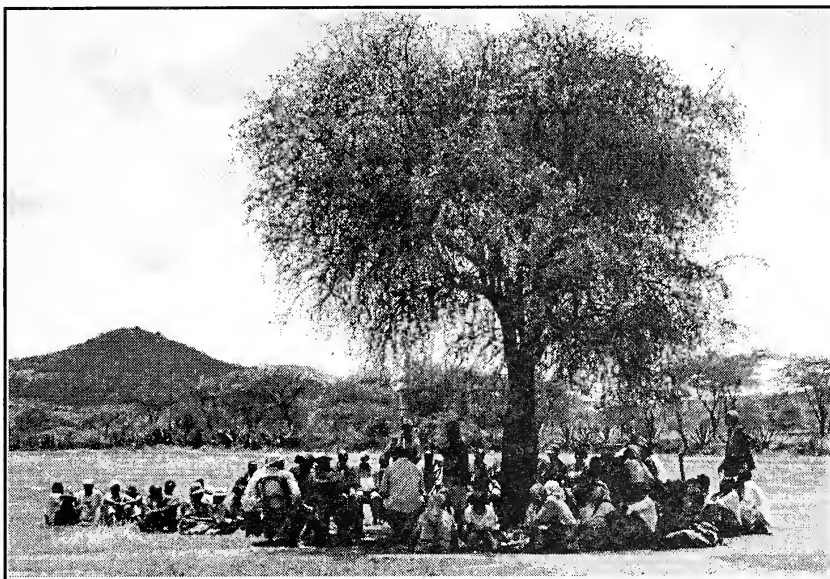
The author (at right) and another CCF volunteer releasing a cheetah back into the wild. (Photo by Mary Wykstra)



At left: Cosmas Wambua conducts a meeting with local farmers to find ways in which they can co-exist with the cheetah. CCF works with local communities to help the people understand the importance of conservation of the remaining cheetah population. (Photo by Kayla Grams)

Mary and Cosmas have met with this community on numerous occasions and the community has embraced them. I went to a baraza (public meeting) with them on a couple of occasions. After helping Mary and Cosmas learn how to use the radio collar and tracking antennae, we showed participants at the baraza the equipment and what we could do with the equipment. The community is supportive of this project, however, the struggle continues as poaching is very common in this country. Compensation for the loss of livestock is an increasing issue and in the forefront of the

requests from the community. Mary knows that such a program could be a double edged sword, but by working in the community she has developed a proposal that would require financial and logistical input from the members of the farming community.



A community meeting between local farmers and CCF representatives.
(Photo by Kayla Grams)

CCF Kenya has received permission to continue cheetah conservation research and program development through 2007. I applaud Mary for her passion and unending desire to fight for this species. Regardless of all her struggles and frustrations there is always the glimmer of hope that keeps her as well as others in the conservation and research field moving forward. If you are interested in volunteering or knowing more about the work in Kenya and Namibia there are more papers in this issue that describe these projects.

Acknowledgements

I would like to thank Cheetah Conservation Fund for permission to use their Education Panel Graphics for this paper.



A Tear

*From a distance there is a tear,
Receiving one, but stalking all.
The dark eye watches you from
Within the tall grasses.
Come closer,
The muscles become tense,
Suddenly there is dust of speed,
A strong body curved with strength
Gets his one.
As he lies with pride,
You will notice
The tear is a cry
For Survival.*

Cindy Du Toit, Grade 9.

The Tear from The Orphan Calf and the Magical Cheetah,
Cheetah Conservation Fund (1996) p. 13.

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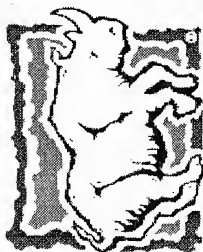
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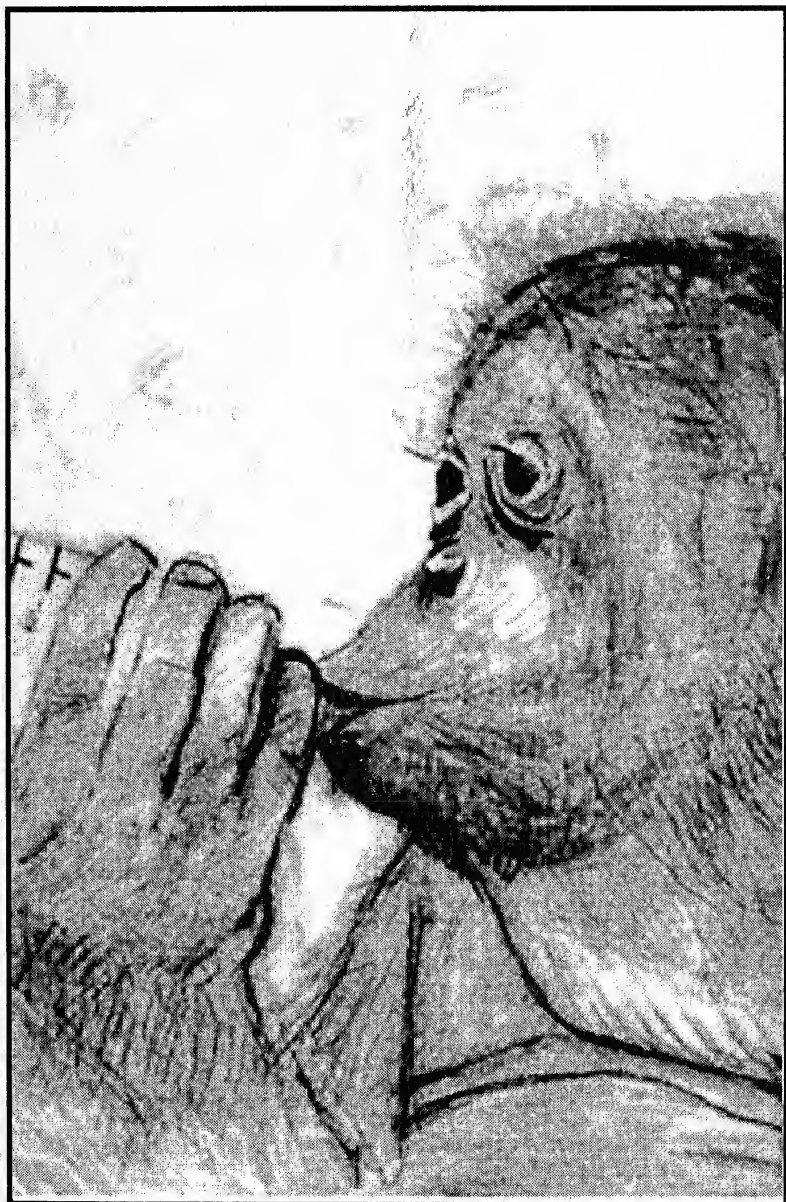
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ANIMAL KEEPERS' FORUM



**The Journal of the American
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SEPTEMBER 2005**

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Animal Keepers' Forum is published monthly by the American Association of Zoo Keepers, Inc., 3601 S.W. 29th Street, Suite 133, Topeka, KS 66614-2054. Ten dollars of each membership fee goes toward the annual publication costs of Animal Keepers' Forum. Postage paid at Topeka, KS.

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About the Cover.....

This month's cover features a Bornean Orangutan (*Pongo pygmaeus*) drawn by Jordan C. Schaul, a veterinary student and PhD candidate in veterinary preventive medicine at The Ohio State University. Orangutans are large apes that live in southeast Asia (on the islands of Borneo and Sumatra). They are arboreal and swing from branch to branch using their long arms. Orangutans can grasp things with both their hands and their feet. The largest males have an arm span of about 7.5 feet (2.3 m). Orangutans are about 2/3 the size of the gorilla. Females weigh about 110 lb (50 kg); male average 200 lb (90 kg). Orangutans are shy, solitary animals that are active during the day. They live alone in large territories. This is probably due to their eating habits; they need a large area in order to get enough food and too many orangutans in one area might lead to starvation. The only long-lasting orangutan social group is the mother and offspring, who live together for about seven years. When mating, the male and female orangutan stay together for only a few days. The word orangutan means "man of the forest" in the Malay language. Orangutans live up to 50 years in captivity; their life span in the wild is only 30-45 years. As its habitats are being destroyed by man, the orangutan's population is decreasing and it is in grave danger of extinction. Thanks, Jordan!

Animal Keepers' Forum publishes original papers and news items of interest to the animal keeping profession. Non-members are welcome to submit articles for consideration. Articles should be typed or hand-printed and double-spaced. Authors are encouraged to submit their manuscripts on a disk as well as in hard copy form. Manuscripts submitted either on disk or electronically as attachments to an email should be submitted in Microsoft WORD. All illustrations, graphs, charts and tables should be clearly marked, in final form and should fit in a page size **no greater than 5.5" x 8.5"** (14cm x 22cm). Literature used should be cited in the text (Brown, 1986) and alphabetically in the final bibliography. Avoid footnotes. Include scientific name (as per ISIS) the first time an animal name is used. Thereafter use common name. Use metric system for weights and measurements (standard equivalents may be noted in parenthesis). Use the continental dating system (day-month-year). Times should be listed as per the 24-hour clock (0800, 1630 hrs. etc.). Glossy black and white or color prints (minimum size 3" x 5" [8cm x 14cm]) are accepted. Clearly marked captions should accompany photos. Please list photo credit on back of photo. Photographs may be submitted electronically as either JPEG or TIFF file attachments.

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Scoops & Scuttlebutt

Chapters Support AAZK, Inc., ICZ & Adopt-A-School

The AAZK Board of Directors and the Administrative Office staff would like to thank the Greater Kansas City AAZK Chapter for their \$250.00 for the Association's general operating fund. We also wish to acknowledge the following Chapters that have sent in donations in support of the International Congress on Zookeeping: Greater Cleveland AAZK, \$1,000.00; Greater Kansas City AAZK, \$250.00; Point Defiance AAZK, \$150.00; and Dallas AAZK, \$750.00. Donations to ICZ will help keep individual delegate fees down and also assist in helping keepers from developing countries attend. The Dallas chapter has also donated \$500.00 to the Adopt-a-School Program that helps fund the schools located on the Lewa Wildlife Conservancy. Our sincere thanks for your most generous support of AAZK, Inc., International Congress on Zookeeping, and Adopt-a-School.



We would like to send out a very special "Thank You" to the Utah Chapter of AAZK and the Hogle Zoo for their donation of \$500.00 to help cover the printing and distribution expenses for the special July/August dedicated *AKF* issue on cheetahs. The Utah Chapter is a long-time supporter of the Cheetah Conservation Fund through their annual Cheetah Cha-cha.

AAZK Board of Director Election Results

Following balloting by the Professional membership of AAZK, Inc., incumbent Denise Wagner (The Phoenix Zoo) was re-elected; and Andy Henderson (Lincoln Park Zoo) was newly elected to the AAZK Board of Directors. Continuing on the Board are current members Jacque Blessington (Kansas City Zoo), Kevin Shelton (Disney's Animal Kingdom), and Shane Good (Cleveland Metroparks Zoo). The election was certified by the the firm of Cummins, Coffman, CPA's, P.A., Topeka, KS. Denise has been elected to a second term as AAZK President and Shane will serve as Vice President. Retiring from the Board after serving from 1999-2005 is Bruce Elkins (Indianapolis Zoo).

Please Note E-mail and Website Changes for Bowling for Rhinos

You are asked to update your email address book for Patty Pearthree, Coordinator for AAZK's Bowling for Rhinos program. Patty may now be reached at ppear3@pear3.org. You are asked to use this email address if you need to contact Patty concerning your planned BFR event, or if you have questions about holding an event.

Also, please make note that the Bowling for Rhinos website has changed its URL. The correct web address is <http://www.aazkbfr.org>

AAZK International Outreach Committee Seeks Chairperson

The International Outreach Committee (IOC) is seeking applicants for committee chairperson. To apply, please send a resume and cover letter to Shane Good at sjg@clevelandmetroparks.com

Job Description *Essential Functions*

- Works with the International Outreach Committee members and Board Oversight in coordinating AAZK's outreach endeavors
- Coordinates Project M.A.R.C. (*Making A Realistic Contribution*)
- Coordinates innovative workshops for the professional development of keepers, particularly in developing countries
- Works with AAZK's steering committee members on the International Congress of Zookeeping (ICZ)

- Appoints and supervises the Latin American Liaison
- Writes written reports of the committee's progress to the AAZK Board of Directors
- Facilitates committee meetings and workshops
- Presents written and/or oral updates to the membership
- Manages the International Outreach Committee's annual budget

Qualifications

- Minimum three (3) years membership in good standing, AAZK, Inc.
- Minimum three (3) years professional experience in zoo animal care
- Has the ability to make international contacts in the zoological field and work with a culturally diverse team. Promotes the professional development and conservation goals of AAZK and its international partners.
- Strong written and oral communication skills
- Strong computer skills
- Demonstrated ability to manage projects, solve problems, work with a diverse team, and meet deadlines
- Fluency in additional languages, particularly Spanish, will be helpful, but is not necessary.

Grants Committee Has New Chair

The AAZK Grants Committee is now being Chaired by Shelly Roach of the Columbus Zoo. Long time Chair Jan Reed-Smith has stepped down from this position. The AAZK Grants Committee oversees the administration of the following granting programs: *The Geraldine Meyer/AAZK Professional Travel Grants*, *Advances in Animal Keeping Course*, *Conservation, Preservation, and Restoration Grant* and *Research Grant*.

Information about these grant opportunities and application forms for the AAZK grant program are available on the AAZK website (www.aazk.org) or by contacting the Grants Committee Chair Shelly Roach (shelly.roach@columbuszoo.org).

Three AAZK Animal Data Transfer Forms Now Available Online !!

The American Association of Zoo Keepers, Inc. encourages all zoos and other animal care facilities to utilize the following data transfer forms whenever they are shipping an animal between facilities. Providing this information to the receiving facility will ease the transition of a new animal into the collection and provide vital information to receiving staff. With the greater emphasis on enrichment and training at all AZA-accredited facilities, this information will prove especially important in providing continuity and consistency when an animal is shipped.

All three forms are now available in downloadable pdf format at www.aazk.org<

All collection managers are asked to include all three of the forms where applicable whenever an animal is shipped. THREE copies of each form should be sent with the animal being shipped. At the receiving institution these copies should be distributed to the following staff:

- a) Curator b) Keeper who will be caring for the animal c) Zoo files and/or veterinarian

1. The original **Animal Data Transfer Form** provides information on the animal, its diet, reproductive history, medical and physical husbandry information, etc. This form is one page in length.
2. The **Enrichment Data Transfer Form** provides information on the animal's behavioral

history, and data on what types of enrichment have been utilized and their success or failure with the particular animal. This form is two pages in length.

3. The **Operant Conditioning Data Transfer Form** provides background information on any training that has occurred with the animal, training schedules, types of training, animal's reaction to training, etc. This form is two pages in length.

We all seek to provide the best and most professional care possible for the animals in our collections. Using the three AAZK data transfer forms will help provide receiving institution staff with the tools to make this possible. Your cooperation and participation is encouraged and appreciated. These forms are provided as a professional courtesy by AAZK, Inc.

Conference 2006 Opens Website

AAZK will be heading to Chicago in the fall of the 2006 for its National conference. It is being hosted by the Lincoln Park AAZK Chapter and the Lincoln Park Zoo. They now have a website up and will be adding information on the upcoming conference as it becomes available. The website address is www.aazk2006.org< There is also a link to this site from the main AAZK website (www.aazk.org).

Husbandry Manuals Register in Progress--Submissions Sought

The ASZK has commenced a project which aims to create a "register" of all Husbandry Manuals which are currently available, and make this list freely available to everyone from the ASZK Web Site. Currently there is no central listing of the various Husbandry Manuals which have been produced, nor who to contact to obtain copies of specific manuals, and it is hoped that by providing this service we will be supporting keepers in their efforts to improve the husbandry and welfare of the species in their care. For this project to succeed though, we need your help! If you have written a husbandry manual or know of someone who has, could you please e-mail the details (see below) to me at Geoff.Underwood@ASZK.org.au or alternatively you can download the registration form at <http://www.aszk.org.au/Husbandry%20Manuals.dwt/> While this project has been initiated by the ASZK, it is not limited to Husbandry Manuals from the Australasian region, and we are looking to have the registry include manuals from Europe, the US and elsewhere as well.

Husbandry Manual Registration Details should include the following:

Species: Common Name and Latin/Scientific Name

Manual Details

Publication Date

Author(s)/Editor(s)

Available from

Contact person

Postal Address

Phone

Fax

E-mail

Electronic version available?

Hard copy version available?

Cost (to purchase - if any)?

Copyright holder?

If this manual is freely available for downloading from a web site, please provide the site address;

Other: Is the full version available for inclusion on web site?

Submitted by: e-mail address:

Black Kingsnake Web Site Online

There is now a website devoted exclusively to the Black Kingsnake (*Lampropeltis getula nigra*). There is comparatively little information available on the web regarding this subspecies of the Common Kingsnake and we thought it would be beneficial to develop a site that would help fill this void. As you will see this is a group effort with my colleagues Scott Waters and Will Bird, and we intend this to be the type of site that will be updated frequently with additional sources of information and photographs (with locality). If anyone has any contributions, they would be much appreciated. Any feedback is also welcome. The Black Kingsnake web site can be accessed at <http://www.blackkingsnake.com/>

Coming Events

Aquarium & Zoo Facilities Association (AZFA) Annual Conference - 25-28 September 2005 - hosted by the Tennessee Aquarium, Chattanooga, TN. For further information see <http://www.azfa.org> or call Laural Smith at the Tennessee Aquarium (423) 785-4002; fax (423) 267-3561.

New World Primate Workshop (A focus on Cebids) 30 September - 1 October 2005. The Cleveland Metroparks Zoo announces a workshop on New World Primates that will focus on the captive care of Cebids in U.S. institutions. Informal roundtable discussions will include the following topics, diet and health, social groups and mixed species, enrichment and training behaviors, and population management. The workshop will begin at 10 am on Friday, September 30, and end at 4 pm on Saturday, October 1. Attendance is limited to 50 people and registrants will be asked to complete a pre-meeting survey regarding their experiences with Cebids. The workshop will be held on the zoo grounds. Some meals will be provided and local lodging suggestions can be provided. Registration fee = \$25. For more information and a registration form contact Tad Schoffner at 216-635-3332 or email at tad@clevelandmetroparks.com

60th Annual Conference of the World Association of Zoos and Aquariums (WAZA) - 2-6 October, 2005. Hosted by the Wildlife Conservation Society at the Marriott Marquis in Manhattan, NY. Attendance restricted to WAZA members. For more information, visit the Conference website at www.waza2005.org

Zoological Registrar's Association (ZRA) 2005 Annual Conference - 5-8 October 2005 in Tacoma, WA. Hosted by the Point Defiance Zoo & Aquarium. For more information contact Marla Waddell at (253) 404-3654 or email registrar@pdza.org or see their website at or see their website at <http://www.zra.homestead.com/conference.html>

26th Annual Elephant Managers Association Workshop - 5-9 October, 2005 in Portland, OR. Hosted by the Oregon Zoo. Pre-conference trip will be to the Point Defiance Zoo (5 Oct.); the post-conference trip will be to Wildlife Safari (10 Oct.). For more information please visit their website at <http://www.oregonzoo.org/ElephantWorkshop> or email elephants@metro.dst.or.us

2005 Annual Conference of the American Association of Zoo Veterinarians - 15-21 October, 2005 in Omaha, NE. For information contact Wilbur B. Amand, VMD, AAZV Exec. Dir., 6 North Pennell Rd., Media, PA 19063; Ph - (610) 892-4812; email aazv@aol.com; or check the website at www.aazv.org

Reptile and Amphibian Training and Enrichment (R.A.T.E.) Workshop - 8-10 December 2005 at Disney's Animal Kingdom, Lake Buena Vista, FL. For more information about R.A.T.E., the national

workshop and/or the listserve and how you might participate, please contact Andy Daneault (andre.j.daneault@disney.com) or Vance Alford (vance.c.alford@disney.com).

14th Annual Conference of The International Association of Avian Trainers and Educators (IAATE) - 15-18 February 2006 in Nashville, TN. This year's theme is "Soaring to New Heights". The conference is being hosted by the Nashville Zoo at Grassmere, at the Nashville Sheraton Downtown Hotel. For further information, please visit www.iaate.org. You can also contact Alicia Douglas (aliciadouglas78@yahoo.com) or Jacqueline Walker (jwalker@nashvillezoo.org).

Second International Congress of Zookeeping (ICZ) 7-11 May 2006 in Gold Coast, Queensland, Australia. Visit website: <http://www.iczoo.org> for latest information. See information on Second Call for Papers in the May 2005 issue of *AKF*.

2006 International Gorilla Workshop - 23-26 June 2006 at Paignton Zoo, Devon, England. Will include Icebreaker, three days composed of plenary sessions, discussion workshops and zoo visits. Post-conference tour will include several significant U.K gorilla/primate collections including Howletts and Port Lympne Zoos. Watch here for further information.

21st Congress of the International Primatological Society - 26-30 June 2006 in Entebbe, Uganda. For further info: wolupot@yahoo.com

33rd AAZK National Conference - 15-20 September 2006. Hosted by the Lincoln Park Zoo AAZK Chapter and the Lincoln Park Zoo, Chicago, IL. See information at their website www.aazk2006.org

AZA Annual Conference - 25 - 30 September 2006. Hosted by Busch Gardens, Florida Aquarium, & Lowry Park Zoo Tampa, FL. See information at their website <http://www.aza.org/ConfWork/AboutAnnualConf/#fut>

18th IZE Biennial Conference. International Zoo Educators Association - 25-30 September 2006. Hosted by the National Zoo of South Africa, Pretoria, South Africa. For more information visit <http://www.izea.net>

6th International Parrot Convention - 27-30 September 2006 at Loro Parque, Tenerife. For more info visit <http://www.loroparque-fundacion.org/>

Post Your Coming Event Here - email to:

akfeditor@zk.kscoxmail.com



From the Executive Director

Message to the Membership

In June of this year, AAZK lost one of our cornerstone members to cancer. Lee Houts has been a contributor and a role model to zoo keepers for a number of years. Lee was a consummate professional and an asset to this Association. She valiantly fought her illness, as her strength would allow.

My interactions with Lee took place in short bursts. E-mails, memos, meetings and quick updates in the hallways during a conference were our method of communication. But whatever needed to get done, I asked, and it was simply done.

A few members of your Board and myself were fortunate to meet with Lee during the AZA Schools that were held in Sacramento in March of this year. Over dinner conversation, I was impressed with how comfortable Lee was, with "her place in the world". She casually brushed off any comment about her contributions to AAZK, and instead, steered the conversation back towards the accomplishments of her peers and friends.

I have often heard of strength and dignity in individuals who are confronted with a fatal prognosis in the course of medical treatment. I've not personally observed it, until meeting with Lee one last time. She was a remarkable person. She will be missed by all that knew her, both personally and professionally.

Ed Hansen
Executive Director AAZK
Tucson, AZ



Remembering Lee Houts

1953 - 2005

In early 2004, the AAZK Enrichment Committee was in the process of selecting new members from an unusually large and qualified pool of candidates. Lee Houts had recently stepped down as the long-time Chair of the committee and passed the torch to me. This made it my job to receive the resumés for the Enrichment Committee hopefuls and circulate them to the rest of the committee for review. As the resumés arrived in my inbox, it was not surprising to read in their cover letters that a great many of the candidates had the exact same inspiration for wanting to join the committee and that reason was Lee Houts. Several candidates wrote about how discussions with Lee at a conference had been exceptionally memorable. Others stated that attending her papers, or participating in her workshops had led them to a new understanding of enrichment and its importance. Some spoke of her enlightened views regarding animal welfare and progressive techniques in animal care and therapy. I recall marveling at that time about how large the scope of Lee's influence must be. Almost all of the letters used some form of the word "inspire" when describing what Lee did for them. And I understood what they all were talking about completely - she had done the same thing for me over and over again over the course of our friendship.

Lee Houts passed away on June 21, 2005. Because Lee inspired so many people during her life, it seemed most fitting to compile thoughts and memories from those she inspired, in tribute to her life and work. Lee Houts is undeniable proof that a single life can make a world of difference.

Amy Burgess
Disney's Animal Kingdom

"Lee's contributions to the profession of zoo keeping cannot be measured in quantitative terms. Her passion, commitment, and professionalism to zoo keeping were paramount and we have truly lost an innovator and leader. I personally have lost a friend and I'm proud to say I knew her. Her loss will be felt for years to come in AAZK and in this profession, of that I have no doubt. I miss her and am thankful I had the opportunity to know her." *Denise Wagner, The Phoenix Zoo*

"I'll always remember Lee as a genuinely nice and thoughtful person. She went out of her way to help people and remembered everything about everyone. The last time I saw her was at the 6th International Conference on Environmental Enrichment (ICEE). After sending her copies of some pictures I took at the conference, she sent me a tape of African Christmas songs to remember our time there. She didn't have to do that; but she did. That's just the way she was - and how I'll always remember her." *Yvette Kemp, Sr. Mammal Keeper - San Diego Zoo*

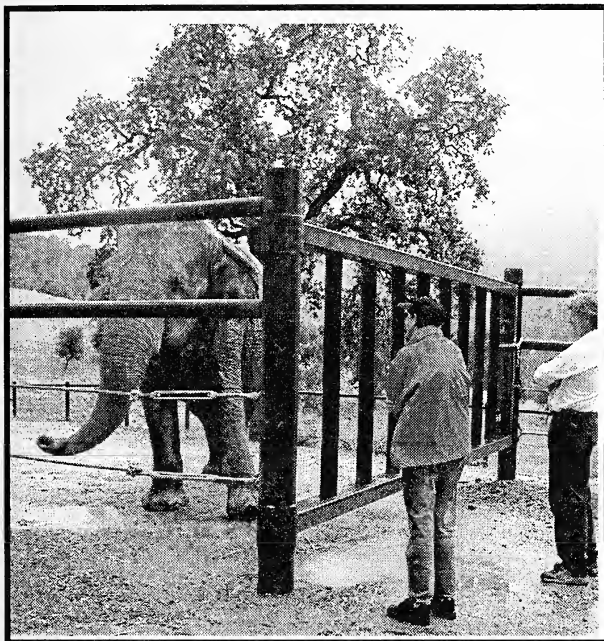
"It is very hard to put into words the affect Lee has had on my life working at the zoo and even my personal life. Our conversations were always zoo/animal related, but there never seemed to be enough time to hear all that she had to say. I consider myself very lucky to have had the time with her that I did and to have learned some of what she had learned over her many years as a zookeeper. She made me realize that there were so many more possibilities and perspectives in a field that I was already excited to work in. *Lynn Dowling, Folsom Zoo and Sanctuary*

"Lee was an incredible woman and although I was always her Supervisor here, she taught me many things. She really started the enrichment and training program here at our facility and taught so many staff and volunteers the importance of both. Her dedication to the animals was always a number one priority. Lee and I spent many hours in the parking lot after work or on the phone talking about the animals and things we could do to improve their lives.

I always knew that I could ask Lee anything and get an honest answer. I appreciated her advice on many issues and also her willingness to listen. I also respected Lee, because if she really believed in something she would not back down. I loved debating with her on issues and I knew there were never any hard feelings. We shared a lot of the same ideas, frustrations and goals. Lee was always supportive of me and was a great mentor to me in many ways. I will miss her so much and I know the animals will too!" *Jill Giel, Folsom City Zoo/Sanctuary*

"Lee was always "cutting edge" in her work; always at the front of the evolutions in animal care and handling. She was creative and meticulous in planning out solutions to problems that often had never been addressed before. And whether it was solving novel elephant problems, figuring out a way to do giraffe foot trims, or....you name it....Lee was also fearless in her resolve to invent ways to provide the best care possible for her charges.

Lee's steadfastness in her convictions to provide the best physical and behavioral care for captive animals was not a whim; she remained true to her mission for decades. Even when quite ill, she continued to do what she could for animals. She continued until she literally could do no more. May you rest in peace, Lee. You helped make the animal care revolution happen; your work was incredibly well done. *Ellen Leach, Behavioral Resources, Inc.*



Lee with "Winkie", an elephant she had worked with at the Sacramento Zoo, who now lives at the PAWS Sanctuary. Shown with Lee is Ed Stewart, PAWS co-founder .

I think I first met Lee at a conference at the Oregon Zoo on environmental enrichment. That was in 1993 and since then I have met Lee many times and corresponded with her often as she became one of the strongest advocates for using environmental enrichment to improve the well-being of zoo animals. I remember vividly her enthusiasm for carcass feeding and the way that she went about encouraging us all to follow her example. She was a terrific example to all of us and living tribute to how much difference one person can make. All of us in the zoo business have benefited from Lee's legacy and we will miss her expertise and great spirit tremendously. *David Shepherdson, Oregon Zoo*

"Anyone who has heard Lee Houts speak knows how passionate Lee was about the animals she cared for. For that matter, how passionate Lee was about everything she cared for. Lee was one of the most inspiring people I have ever met and she made you just want to be the best keeper you could possibly be. So often when I am having too much fun making some crazy enrichment item, I think of Lee. In fact, if I think I'm having a brilliant idea, it is probably Lee channeling her amazing energy! Our zoos are a better place because of her love. *Suzanne Forror, San Diego Zoo*

"I met Lee Houts first when I started going to the International Enrichment conferences. I got to know her better when we hosted 5ICEE at Taronga Zoo in Sydney in 2001 and she came and from that time on, I considered her a friend and mentor, emailing her when I had an enrichment problem and looking out for her articles in *Shape of Enrichment* and contributions to the Enrichment Listserve. She was always quick to respond and her advice was always good. The next time we met was in Johannesburg in 2003 and I was looking forward to seeing her again in New York.

Lee was of great assistance when Jo Walker and I (under the auspices of ASZK) took over the AAZK/*Shape of Enrichment* Video Library management in this part of the world - she sent tapes, instructions, information and basically everything we needed to get started. If there were problems, she was again only an email away. So from Down Under we will miss her and we send our love to her family and friends in Folsom." *Margaret Hawkins, Taronga Zoo*

"Lee and I had incredibly deep, meaningful conversations about captive wildlife; from ways to enrich individual animals' lives, to what it means to be a healer of animals, to the very essence of animals' souls. She inspired me professionally and personally, and forever affected and affirmed my commitment, obligation, and connection to the animals that I am privileged to care for." *Jackie Gai, DVM*

Lee was certainly a 'live life to the fullest' lady. Through all her adversity, she continued to 'live' as much as possible and continued to work hard to ensure the best possible care for animals she had under her charge. Many animals' lives were greatly enriched by her 'above and beyond' efforts. Her efforts will be remembered by many folks." *Pam Pritchard, Calgary Zoo*

"Have you ever left a hose in an exhibit by accident? We have all done this. I will never forget visiting Lee at Folsom and she was putting the Tigers out. I saw the hose, but Lee was not visible for me to let her know that the hose was still there. How many times have you played tug of war with an animal? Lee played tug of war with the Tiger and finally won! We laughed about it afterwards. Lee was so down to earth and appreciated life regardless of all of its twists and turns that it threw her." *Kayla Grams, USGS, Grand Junction, CO*



Lee with colleagues and friends at an International Conference on Environmental Enrichment

A Portrait of Lee....

"During the last seven years I've been fortunate to get a glimpse into who Lee was.

Laura Lee Houts was a daughter and a sister.

She was an artist - a great artist.

She was a zookeeper and an animal trainer, an ambassador for animal welfare.

- One of the first to look into voluntary hoof trims for giraffes
- She was a pioneer in animal enrichment and an inspiration – my inspiration in carcass feeding.
- Passionate about animal welfare – served on the AZA Animal Welfare Committee
- Chaired the AAZK Enrichment Committee for many years
 - AAZK Enrichment Notebook – is now being translated into three languages
 - Video Night at AAZK Conferences
 - Training and Enrichment Video Library - now worldwide

She was an educator – Working one full-time job already, Lee partnered with a friend to start an animal outreach company. She maintained an education animal facility at her house and conducted outreach programs to schools and various other organizations in order to inspire others to protect animals and their habitats.

She was a risk taker, implementing a holistic health program for a geriatric bear that included acupuncture and reiki.

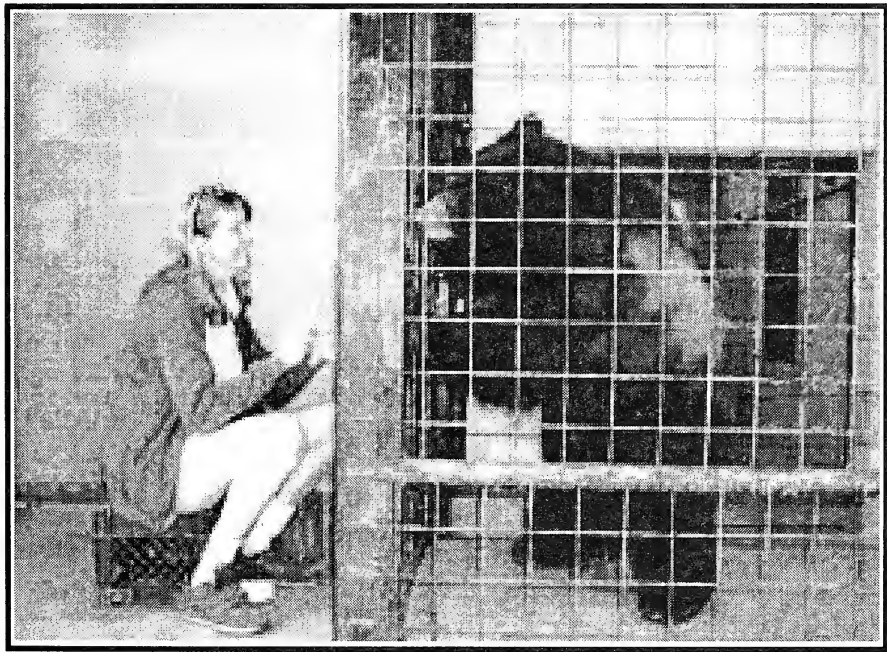
Lee was an adventurer. Several years ago she compiled a list of things she wanted to do in her lifetime. And an impressive list at that. Within the last eight years, she traveled to Africa, Australia (and dove the Great Barrier Reef), and went skydiving. And she was scheduled to travel to China to walk on the Great Wall just days after she passed away.

Above all, Lee was a friend. An amazing friend. And an inspiration. She was always concerned with everyone else's welfare and would walk to the end of the earth for anyone she cared about. She was an amazing listener and supportive. She was a cheerleader. How many times have we all heard her say, "You're the best"!

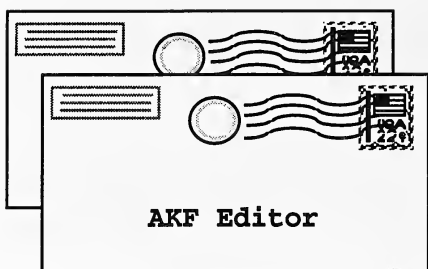
To my friend, my colleague, my inspiration -

You're the best!

-----Beth Stark, Toledo Zoo



Lee training a bear at the Folsom Zoo & Sanctuary



Letters to the Editor

Readers are welcome to comment upon material published in Animal Keepers' Forum through a Letter to the Editor. We welcome a free exchange of ideas benefiting the zoo keeping profession.

Dear Editor,

I want to congratulate you and *AKF* for the exceptional July/August issue on Cheetahs. Having worked with the species in captivity and having observed them in the wild, I was very impressed to see articles about captive and wild cheetahs in this issue. In my opinion it is the best *AKF* I have seen, and I've been a subscriber since December 1975!

I have a couple of comments on two of the articles that you may choose to share with your readers.

Nancy Vandermeij - Cheetah Conservation Botswana. On Nancy's night game drive in Mokolodi Nature Reserve she mentions that she saw an "armadillo". I believe the animal that she saw was the "ground pangolin". If that is the species that Nancy saw, she should consider herself very lucky. I've never seen one on my 20 trips to Africa. I have met many game rangers and tour guides who have never seen this species or perhaps once or twice in their careers. I've met a researcher at a private game reserve in Botswana who had a standing offer to provide a bottle of vintage scotch-whiskey to any tourist or driver who spotted one on his reserve.

Katherine Bell - Mortality in Hand-Reared Cheetah Cubs. In her introduction Katherine mentions a birth in 1956 in which the "litter did not survive past three days of age". Katherine is referring to a female cheetah that gave birth in the Philadelphia Zoo's "Lion House" in 1956. The fact that such a reportedly "sensitive feline" gave birth in such an antiquated designed building that had public access less than six feet from denning areas has always amazed me and other keepers who have worked in or seen the building. Katherine does not mention that in 1957, this same female gave birth to two cubs that she tended for two weeks until disturbed by a noisy crowd of school children. After the mother showed stress, the cubs were removed and successfully hand reared until three months of age when they died of panleucopenia. An old-time keeper who worked in the "Lion House" from 1949 to 1983 - Montgomery Simmons (a 1983 recipient of an AAZK Excellence in Zoo Keeping Award) - told me that he believed the cubs actually died due to a bad reaction from a rabies vaccination. A brief record of these births can be found on page 398 of Lee Crandall's "Management of Wild Animals in Captivity".

Regards,

Bob Berghaier
Premier Tours
Philadelphia, PA

If You're Moving.....

Make sure to notify AAZK National of your change of address. Don't miss a single *AKF* issue! Call: 1-800-242-4519 (US) or 1-800-468-1966 (Canada) or you can email: aazkoffice@zk.kscoxmail.com<

AAZK Announces New Members

New Professional Members

Lauren Frisoli, **Zoo New England (MA)**; Al D'Ercole, **Roger Williams Park Zoo (RI)**; Tamara Myhal, **Turtle Back Zoo (NJ)**; Heidi Dull and Jodi Neely, **North Carolina Zoological Park (NC)**; Andrea Clay, no zoo listed (GA); Erin Meyers, **Palm Beach Zoo (FL)**; Tricia Fowler, Kathy Driggers, Ashleigh Lutz, Keri Perocchi, Sheila Zander, Angela Smith, Vickie Zavosky, Heather King, April Adams, Cara Kruse, and Heather Fassel, **Busch Gardens (FL)**; Tarah Jacobs, Liesl King, Kimberly Kerns, Melissa Olivencia, Stacie S. Tippet, Rose Tremblay and Lelani Konecny, **Disney's Animal Kingdom (FL)**; Lesa Howell, **Lubee Bat Conservancy (FL)**; Dawn Sacino, no zoo listed (FL); Ann Kelly, **Hernando Primate (FL)**; Patricia Beaven, **Sea World Orlando (FL)**; Kesi Nowell, Samantha Arnold and Jessica Garon, **Baton Rouge Zoo (LA)**; Jenna L. Conforti and Chad Fifer, **Knoxville Zoo (TN)**; Mike Wines, Kay Kaczmarek and Lillian Kortlandt, **Memphis Zoo and Aquarium (TN)**; Alisa Keys, **Indianapolis Zoo (IN)**; Edward Frederick, **Fort Wayne Children's Zoo (IN)**; Kim Downey, **Scoville Zoo (IL)**; John Staubach, **Cincinnati Zoo & Botanical Garden (OH)**; Audrey Willard, **Great Plains Zoo (SD)**; Leah Oetting, **Pine Grove Zoo (MN)**; Collette Knokel, **Milwaukee County Zoo (WI)**; Mery Schumacher, **Folsom Children's Zoo (NE)**; Nicky Demkey, no zoo listed (NE); Jaimee Flinchbaugh, **Oklahoma City Zoo (OK)**; Andrea Armbrust, **Cheyenne Mountain Zoo (CO)**; Owen Carroll, **Utah's Hogle Zoo (UT)**; Dorothy Ramowski, **Alameda Park Zoo (NM)**; Anne Avery, **Albuquerque Biological Park (NM)**; Stephanie Grisham, no zoo listed (TX); Daniel Dembiec and Amy Anderson, **Dallas Zoo (TX)**; Jesse Gilbert, **Texas State Aquarium (TX)**; Anita Barron, **The Aquarium at Moody Gardens (TX)**; Wayne Fischer and Angela Stewart, **Heritage Park Zoo (AZ)**; Susan Logan, Brian Dietz and Anna Young, **The Phoenix Zoo (AZ)**; Joanna Bojarski, **Woodland Park Zoo (WA)**; Juli Bianchi, Kerianne Mills and Karla Gaitan, **The Living Desert Zoo & Gardens (CA)**; Anne Jordan, Kelly Murphy, Katie Kimble, John Wes Hardin and Dan Mondl, **Santa Barbara Zoo (CA)**; Victoria M. Swanson, **San Francisco Zoo (CA)**; Jill Andrews, no zoo listed (CA); Monica Welker, **Happy Hollow Park & Zoo (CA)**; Sonia Hoska and Scott Norwood, **Toronto Zoo (Ontario)**; Carla Ellia, Christopher Barlishen, and Ron Enberg, **Assiniboine Park Zoo (Manitoba)**; and Isabelle Dubois, **St. Felicien Zoo (Quebec)**.

Renewing Contributing Members
David R. Morris, President - ZuPreem Mission, KS

Jason Peterson
Utah's Hogle Zoo, Salt Lake City, UT

Vernon N. Kisling, Jr.
High Springs, FL

Steven M. Wing
Louisville Zoo, Louisville, KY

Renewing Institutional Members
Busch Gardens
Tampa, FL

Birmingham Zoo, Inc.
Birmingham, AL

Arizona-Sonora Desert Museum
Tucson, AZ

Oregon Zoo
Portland, OR

Alaska Zoo
Anchorage, AK

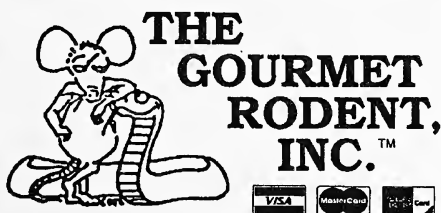
Out of Africa Wildlife Park
Camp Verde, AZ

Catoctin Wildlife Preserve & Zoo
Thurmont, MD

New Institutional Members

Sacramento Zoo, Sacramento, CA
Mary Healy, Director

Hillcrest Park Zoo, Clovis, NM
Herschel, Director



RATS AND MICE

Bill & Marcia Brant

6115 SW 137th Ave., Archer, FL 32618

(352) 495-9024

FAX: (352) 495-9781

e-mail: GrmtRodent@aol.com

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Second International Congress on Zookeeping

Here's another reminder to mark your calendar for May 7-11, 2006!

SPONSORS NEEDED!

Those of you who participated in the first ICZ last year in The Netherlands know what an amazing experience it was, and we hope you will plan to attend the next one on Australia's Gold Coast. What you may not know is that generous donations from various AAZK Chapters greatly reduced the final cost of attending the conference. In the end, the total cost per participant was just \$350, which included registration, lodging, and most meals. We reached this affordable price thanks to donations from local AAZK Chapters and the various international professional keeper associations.

In some cases, local AAZK Chapters banded together to completely fund keepers from developing countries who would otherwise be unable to attend. These Chapters pooled their resources to pay airfare and registration costs for individuals from Latin America and other areas. We intend to continue this generous tradition, and hope your AAZK Chapter will consider sponsoring a keeper from another country **We currently have identified keepers from Columbia, Papua New Guinea and India to attend.** Start planning an ICZ fundraiser now. If you prefer, you can simply donate to the general operating costs of the conference in order to reduce the overall registration cost for all participants. Your donation can really make a difference to keepers (and animals!) in parts of the world without access to our resources. Please send your designated ICZ donations to: AAZK, Inc., 3601 S.W. 29th St., Ste. 133, Topeka, KS 66614-2054. Any questions? Contact Shane Good: sjg@clevelandmetroparks.com or Norah Farnham: Norah.Farnham@zoo.org

NEW ICZ LOGO NEEDED!

The International Congress of Zookeepers (ICZ) is seeking a new logo. This logo will be used on all ICZ-related items such as letterhead, T-shirts and conference satchels, as well as the website and all future merchandise marketed by the ICZ. To submit a logo for consideration, please follow these guidelines:

- must incorporate the letters "ICZ" in the design
- should be easily reproducible
- should represent zookeeping on a global level
- preferably limit to 2 colors; if you choose to include color send both a color and a black and white version

If you would like to have your design considered as the new logo, please send a **high resolution .jpg** file to: Norah.Farnham@zoo.org Or you may send a hard copy to: Norah Farnham, c/o Woodland Park Zoo, 601 N. 59th St., Seattle, WA 98103 USA.

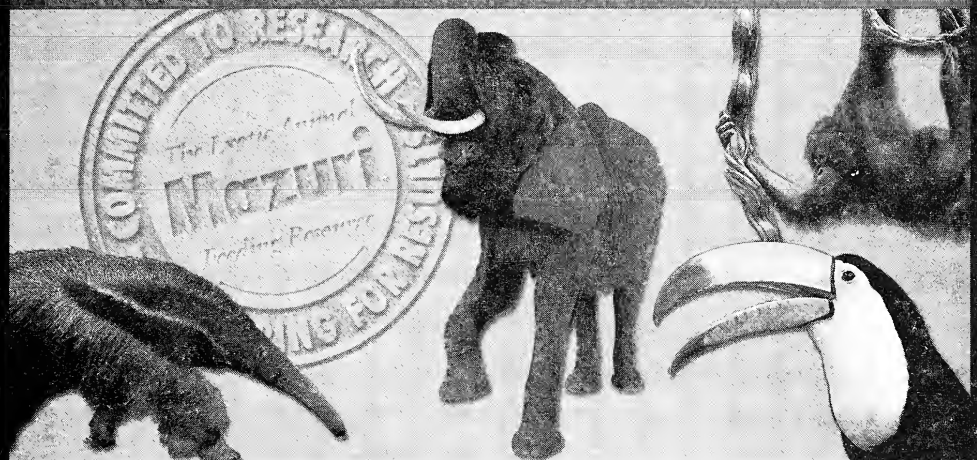
Entries are **due by January 30, 2006**. The Steering Committee of the ICZ will narrow the entries to (5) finalists who will be notified by April 1, 2006 that their design is to appear on the 'ballot' at the congress in Australia. The winning logo will be voted on by the delegates and announced at that time. To learn more about the ICZ, please visit our website at www.iczoo.org

Mission Statement: *"The ICZ (International Congress of Zookeeping) will build a worldwide network among zookeepers and other professionals in the field of wildlife care and conservation. This exchange of experience and knowledge will improve the professionalism of zookeepers for the benefit of the animals under their care and promote awareness and actions that will contribute to the preservation of wildlife everywhere".*

THIRD AND FINAL CALL FOR PAPERS/POSTERS/WORKSHOPS

Deadline for submissions is 30th September 2005

You are invited to submit an abstract of a paper or presentation you would like to give. More information and guidelines can be found at www.iczoo.org Abstracts for oral and poster presentations should be written in English and be no more than 600 words long, (presentations will be 15 minutes, or multiples of). If you want to run a workshop focused on developing zoo keeper skills please send a short description. These should be sent to: Paul Howse, ICZ Programme Committee at p.howse@chesterzoo.org Preferably in RTF or MS word format marked 'ICZ Programme'



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ABC's

ABC's: Animal Behavior Concerns and Solutions

A Question & Answer Forum for Animal Professionals

©2005 by Diana Guerrero, Independent Behavior Consultant
Ark Animals of California, Big Bear Lake, CA



Question:

Do you have any experience with Bridge & Target Training as opposed to Click & Treat Training? If so, do you feel that one method has more benefit than the other?

Answer: Your questions refer to proprietary terms used in the marketing of training businesses. Click & Treat® is a trademark and the phrase, "Bridge & Target Training" has been used to market a business that is supposed to be "beyond behavior modification." Each phrase refers to the work of an individual and I don't feel that one is better or more beneficial than another.

Good trainers are always looking for new tools, but too many people think the current training trends are really new innovations—but they aren't really that new at all. Animal training techniques go back a long way. Unfortunately, many people in different animal industries don't seem to know the lineage of progression. I equate this to the fact that different animal industries don't often encounter papers or share the techniques of others. Many also use different terminology to describe the same behaviors and training methods.

Over time, new names are coined for similar (or the same) techniques and therein lies the difficulty. Often, when I think I've found something innovative, a little digging reveals that it has already been proposed. Nuances can be the differentiating factor and where (or if) you publish. However, timing is everything and innovation means nothing unless there is receptivity to it.

The underlying question you asked refers to clicker training, or more correctly—clicker usage as a "marker" in training. The bridge is a marker and the target is a communication tool used within the training program. Good training programs all require superior communication skills, timing and the understanding of training methodology. An aptitude for training also helps. I believe it is an aptitude that some individuals have and others don't. You also need the interest and motivation to progress.

The first notes I have regarding positive training methodology go back to the innovative Hagenbeck family (Germany) in the 1800's. However, progression toward clicker usage and positive reinforcement methods has roots from within the scientific community—when Fred Skinner coined the term, "operant conditioning" in 1938. (I'm not discounting Pavlov and Classical Conditioning here; I believe the question relates to operant techniques.)

Skinner's students, Keller and Marian Breland, used clickers for training (circa 1943). They formed Animal Behavior Enterprises (ABE), and moved the technique from Skinner's laboratory into the working environment through commercial work. They provided classified work for the government, and were hired by corporate entities such as Sea World, Busch Gardens, and Taft Broadcasting to develop training programs.

On a parallel field, domestic animal training used other techniques. Domestic animals are bred selectively to be tolerant and cooperative in their behavior. The popularized hands-on method for dogs (circa 1944) used choke chains and other aversive techniques. The goal was to quickly train dogs and get them out on the war field. Today those methods still endure.

Unlike circuses and other performance facilities, zoos were still reluctant to interact with their captive animals and adhered to a "leave them alone, they are from nature" philosophy. Many contracted circus trainers or private handlers to conduct their shows. So, the most notable progression came from within the marine mammal field.

Two of the most prominent individuals included Kent Burgess, who served as ABE's Director of Training for over 10 years and who then went to Sea World to serve as the first Training Director; and Robert (Bob) Bailey who was the US Navy's first Director of Training and joined ABE in 1965. Bailey served as Research Director and then General Manager. He subsequently married Marian Breland many years after Keller Breland passed away.

Karen Pryor began using marker-based teaching and training techniques about the time she encountered Bob Bailey in conjunction with her work at Sea Life Park, Hawaii. The marine mammal community thrived using the techniques. But the current popularity of marker-based training techniques (commonly referred to as clicker training) within the general public only gained popularity after the 1984 release of Karen Pryor's highly successful book, "Don't Shoot the Dog."

Coincidentally, the interest in training coincided with the introduction of animal enrichment techniques and zoos began to focus on the mental health and management of their animals through both techniques. The awareness really began to pick up steam around 1987 when Pryor began to conduct seminars on the topic, and escalated in the early 1990's when she and Gary Wilkes popularized the clicker training method within the dog training community.

Also in the 1990's, an individual named Kayce Cover began to promote an animal training business and published articles on intermediate bridges and related topics. What you see now is a new burst of interest triggered by recent appearances (2003-2004) at professional venues.

Training tools and techniques are constantly adapted for use by individuals. What you need to do is go into the tool box and get what you need, find what works for you, discover what you are comfortable with and define your style. The more you read and learn, the better you will be.

Are you a reader with a question? Be sure to submit it—and good luck in all your training endeavors!

About the columnist: Since 1978 Diana L. Guerrero has worked professionally with both wild and domestic animals. Guerrero has been affiliated with and certified by a variety of animal programs in the USA and Europe. Information on her animal career programs, teleseminars and other projects are available through her website www.arkanimals.com. Questions for ABC's should be submitted to Diana by phone at (800) 818-7387, directly through the ABC's questionnaire or email on her website or via regular mail: c/o ARKANIMALS.COM, PO Box 1989 PMB 215, Big Bear Lake, CA 92315 USA.

Where Conservation Begins

*By Scott Temple, US Peace Corps Volunteer
The Gambia, West Africa*

Many of us, at one time or another, have wondered about other places around the world and what kind of conservation work is being done. We usually only read or hear about the large-scale projects like the Lowland Gorilla or African Elephant and not the smaller, locally-based ones. It is from these local projects that all conservation programs are derived, but most of us never hear about them until later, if at all. This article is about one such organization and is intended to raise the awareness of these cornerstone projects and gain the support of all who are involved with the preservation of our environment and all biodiversity.

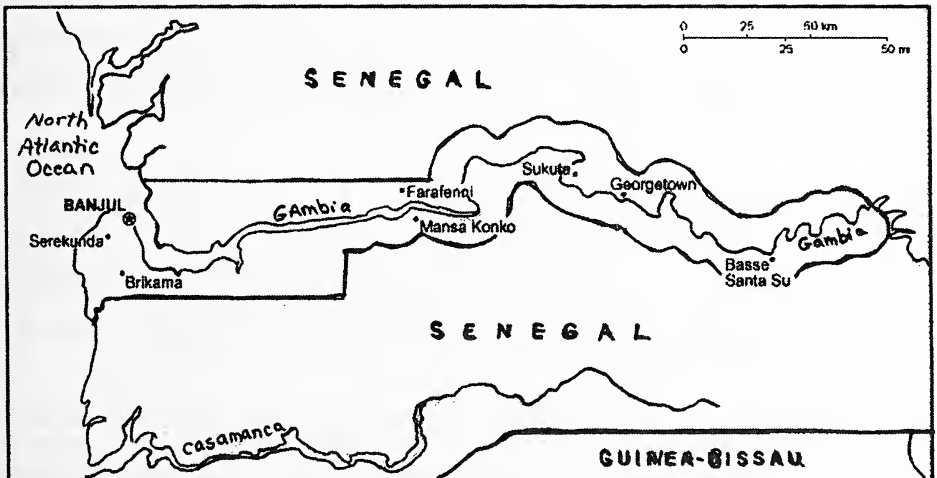
In the western, sub-Saharan region of Africa, surrounded by Senegal on three sides and the Atlantic Ocean on the western border, there is a little-known country called The Gambia. This country is most famous for being the birth-place of Kunta Kinteh from Alex Haley's novel, "Roots". The Gambia is one of Africa's smallest and poorest countries where the environment has been devastated mostly due to overpopulation and poor farming practices. Although many of these problems are being addressed and the situation improved upon, there is still much work to be done. The gradual degradation of the country over many years has had a major impact on the country's forests and wildlife. Most of the forests that once covered The Gambia have diminished. The larger animal species such as the lion, elephant and giraffe have become extinct in the country due to the loss of their natural habitat and uncontrolled hunting practices. These types of negative results are slowly beginning to level out and positive results are appearing. Most of this change is due to the efforts of many volunteers and conservation organizations that provide education and training programs at a local level. Although repairing the damaged habitat will take many years of hard work to accomplish, the country is still very rich in biodiversity and many conservation efforts are underway. One can visit The Gambia and see species like the hippopotamus, spotted hyena, Western red colobus, Guinea baboons and a countless variety of birds and reptiles. Makasutu Wildlife Trust is a leader in these conservation programs.

Makasutu Wildlife Trust (MWT) was founded in 2001 by two very dedicated British ecologists, Dr. Linda Barnett and Craig Emms. Their aim was to establish a charitable organization that will give any profits gained back into protecting the environment. MWT's ultimate goal is to create a sustainable wildlife conservation society that is supported and managed by local Gambians. Dr. Barnett and Mr. Emms had originally come to The Gambia in 1993 as tourists, but were invited back in 1999 to perform a bat survey. After working with the Gambia government Department of Parks and Wildlife Management for three years, a relationship was developed and Craig and Linda formed The Makasutu Wildlife Trust. Within two years, the Trust had become a registered Gambian charity. Most recently, the Trust set up a research station in Abuko Nature Reserve.

Abuko is the smallest protected national park in the country that was originally a water catchment area for the capital city of Banjul. This area became rich in biodiversity due to the water supply and was recognized as such in 1968 when it became the country's first protected reserve. The reserve is one square kilometer with a nature trail that takes you through an indigenous gallery forest and onto the Guinea savannah. Along the way a sharp eye can see many species including Western red colobus and green vervet monkeys, cobras, green mambas, Nile crocodiles and a variety of birds. Bird watching is a very large part of the Gambia's eco-tourist industry and much is already known and written about of the variety of bird species seen in the country. However, no formal species list for The Gambia existed. The task of creating a thorough inventory of indigenous species (flora and fauna) for this region became the first major undertaking by the Trust. This is an ongoing project that will take many years and a lot of hard work to complete, as there are many species, such as

fungi and amphibians, which still need classification. The first thing needed was a field station to work out of so MWT, in partnership with the University of Warwick in the U.K., applied for funding from the U.K. government through The Darwin Initiative (DI). The DI program was established after the Earth Summit in 1992, to provide aid to countries that are rich in biodiversity but lack the funding to protect it. Makasutu Wildlife Trust received a grant that enabled them to build a working research and education facility within the protected area of Abuko. The construction of The Darwin Field Station also created new jobs and now employs nine very dedicated and hard-working local residents and will someday hopefully employ more. The staff is trained through formal sessions and hands-on experience in wildlife conservation, environmental education and species identification and, as the organization's building blocks, are encouraged to share their knowledge with others.

Abuko Nature Reserve is also the home of an animal orphanage. The orphanage was originally built to serve as a rehabilitation center for indigenous species; however, it has become more of a small menagerie due to lack of proper training and funding for rehabilitation work. MWT has taken on the responsibility of running a wildlife rehabilitation clinic separate from the orphanage. In an agreement made with the Department of Parks and Wildlife Management, MWT initially receives all animals brought to the reserve and evaluates their potential as releasable candidates. If they cannot be rehabilitated, they are placed in the orphanage. Two of MWT's staff are responsible for the husbandry of the animals in the wildlife clinic and make frequent visits to the orphanage to evaluate the care of those housed there. The clinic has had successful rehabilitation with many animals including Bushbuck, Pardine Genets, hedgehogs, crocodiles, snakes, turtles, tortoises and many birds such as owls, raptors and Senegalese parrots. The wildlife clinic itself was not part of the original plan for MWT, but when the word got out about them and the work they were doing, people began bringing in injured or orphaned animals for them to care for. The only other option was to place these animals directly into the orphanage with no hope of being released back to the wild.



Makasutu Wildlife Trust has quickly become a renowned and respected organization in the protection of The Gambia's biodiversity. A primary goal of MWT is to promote education, study and research in the natural sciences. The Darwin Field Station contains a biology lab, a lecture room, an education center and a resource center. As well as bringing in researchers from around the world, the center is used for training members of other local agencies like the departments of wildlife, forestry, fisheries and the National Environment Agency. These sessions began as a training class for individuals representing different organizations that could take their new found knowledge back to their respective co-workers; in essence, training the trainers. These trainers now organize and run their own sessions at the field station with assistance from the MWT staff. This so far has proven to be a valuable and self-sustaining project that will hopefully continue for years to come.

There are currently several on-going projects and many are in the planning stages. The Makasutu field officers are presently compiling an in-depth list of the entire flora within the park and their importance as a natural resource. There is a permanent drift fence set up between the pools and the gallery forest and another in the Guinea savanna that are checked daily by the field officers and all species retrieved are identified and logged. A portable drift fence has also been set up at various points around the country when possible. This method has resulted in the discovery of several previously unidentified species and is demonstrating the vastness of The Gambia's biodiversity. The Makasutu Wildlife Trust officers are being trained in improving husbandry practices and are also learning behavioral observation techniques and its importance for both the captive and the free-ranging animals. The wildlife clinic presently houses a group of five patas monkeys that are scheduled to be released just before the rainy season begins in May. We are attempting to acquire some tagging equipment so, once released, an on-going study can be performed on this group and a comparison made between their observed captive behaviors and the success or failure of their rehabilitation.

MWT as a whole is also attempting to improve the quality of the entire reserve including the orphanage. The reserve itself is being threatened by the severe lack of annual rainfall and the only in-coming water source was inadvertently directed away from the reserve due to an urban sprawl effect. The master plan for MWT includes the redirecting of the water back into the reserve. This plan also involves expanding the fence line to include what is now an unprotected buffer zone. This zone has been badly poached by surrounding villages, and the expansion may need to include the out-planting of indigenous trees to aid in its regeneration. The orphanage is in dire need of renovation and proper training for the staff. A plan is currently being devised by MWT to improve housing conditions and to establish a training program for the keepers. With the exception of one, the exhibits are a good size but need some improvements. The poorest exhibit is where the baboons are housed. A group of five individuals are in a two section holding area that, in total, measures approximately 2m x 8m x 2m with no enrichment items. Constructing a proper exhibit for the baboons is the highest priority on the orphanage renovation project. Their present housing situation is due mostly to an out-dated way of thinking; baboons can be aggressive animals so keep them in a small, easily managed area. This way of thinking is traditional in most places around West Africa but, with proper training and education, it can be overcome.

These projects are just the beginning and only a few of what Makasutu Wildlife Trust hopes to accomplish in the years to come. The groundwork has been laid for the establishment of a strong and stable conservation society in The Gambia. Like all cornerstone projects, funding and support are always desperately needed. Most of the funding received by Makasutu is through memberships, donations and sale of a few items like t-shirts and posters. The funding received from The Darwin Initiative will end in October 2005 and it is the goal of MWT to be able to continue on as a valuable environmental training and educational resource for the people of The Gambia.

If you are interested in becoming a member or sponsor or just making a contribution of any kind, please contact us at the addresses below. There are some items that are needed such as a computer (PC or laptop), radio collar equipment, caging materials, books, etc. If you have items to donate, a wish list can be sent to you and arrangements made for shipping.

Makasutu Wildlife Trust
PO Box 2164
Serrekunda, The Gambia
West Africa

Tel: (00 220) 778 2633
E-mail: drumohq@qanet.gm
Website: www.darwingambia.gm

REACTIONS

A Question and Answer Forum for the Zoo Professional on Crisis Management

*By William K. Baker, Jr., Curator
Panthera Research, Maumelle, AR*



Question

What are the latest trends in security and can they be effectively applied to a zoo environment?

Comments

The advancements in security in recent years are truly remarkable and many can easily be utilized in a zoological institution providing two points are kept in mind. One, do you really need it? By that I mean can you really justify the purchase, which leads to the next point. Two, can you afford the cost? Remember that higher quality in security usually equates to a higher price tag. It really depends on what your needs are for the situation. Still, it's possible to hit the high points of some of the technology that's currently in use today and one of these components may be a match for your needs. I should also mention that it might not be necessary to utilize all of these measures, using only one approach may be sufficient.

- Metal detectors, (when they work properly) can be an effective tool. But legal considerations, cost, and the visitor perception should be taken into account prior to implementing use.
- Explosive material detectors, (when they work properly) can be an effective tool. But, once again, legal considerations and the visitor experience should be taken into account prior to implementing use.
- X-Ray scanners, (when the operator has been properly trained) can be extremely effective. Once again, be aware of the legal aspects and the possible negative public perception of usage.
- Automated alarm systems can be effective when equipped with an alternate power source in the event electrical service is interrupted or fails. Monitored systems are best, especially with the human factor.
- Biometric security measures, a relatively new aspect of security in the military and private sector, can be highly effective in unmanned access control. In short, it uses a discriminating physical characteristic which it compares to its database. This is historically expensive, but becoming more affordable. Still, swipe cards incorporating photo ID's are frequently used in the corporate workplace and are an affordable alternative.

Question

Do you have any recommendations for a good sling for either rifles or shotguns?

Comments

There is a never-ending supply of slings on the market that can accommodate virtually any possible need a hunter, sportsman, or crisis manager could possibly think of. As so many things go in life, this too is deeply subject to personal interpretation. Slings are no different.

Over the years I have noted that slings often go in and out of style. Still, like so many accessories in the shooting field, they are designed either for pure comfort or to compensate for poor marksmanship. For many years the best slings I ever used was a simple one-inch leather model that Remington Arms® used to provide free of charge in the box with their 700 Series rifles. It was clean, quick, and quiet.

Probably one of the most comfortable slings I have ever used were the old black web slings that were issued to troops during the Vietnam era. For the past ten years I have been using the black nylon military model that replaced the older web style. I should mention that there are several companies that manufacture slings in this style, most notably are Uncle Mikes®, Blackhawk®, and Eagle Industries®. All are solid performers and should provide good service. If you really want a leather sling, then go with Bianchi® for a new model or check Ebay® for the older Remington slings I mentioned earlier.

Question

I noticed that you recently changed your column affiliation to Panthera Research. What exactly is Panthera and what does it do?

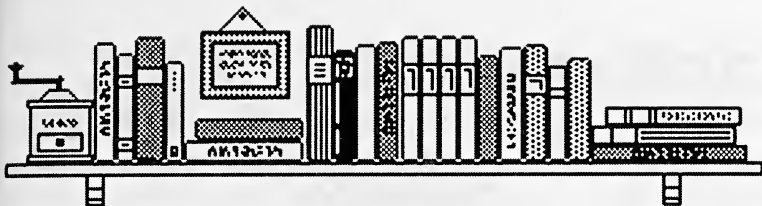
Comments

Panthera Research is a project that has been in development for some time and is just now coming to reality. Effectively it is a research team composed of zoologists and veterinarians who are dedicated to the study of crisis management, environmental enrichment, ethology, and operant conditioning training techniques. Research costs are directly offset through consultation and training services provided to zoological institutions, wildlife refuges, and law firms. The consultations cover master planning, exhibit design, strategic development, animal husbandry, and of course crisis management and zoological safety. As research projects are funded and completed, the material is then released periodically through scientific journals. Specific emphasis is placed on the study of Cougars (*Puma concolor*), Jaguars (*Panthera onca*), and Leopards (*Panthera pardus*). The idea behind all of this is to return something to the zoological and wildlife industry that has had such a significant impact on our professional and personal lives.

Next Month: We are preparing to renovate our cat exhibits. Are there any specific points we should focus on?

If you would like to submit a question for this column or have comments on previously published materials, please send them to AAZK, Inc., 3601 S.W. 29th St., Suite 133, Topeka, KS 66614 Attn: Reactions/AKF

(About the Author: Since 1985 Bill has been active in the fields of science, zoology, and wildlife management. His education and experience include a B.S. in wildlife management and post-graduate studies in zoology, Lab and Museum Assistant, Shoot Team Leader, ERT Member, Large Mammal Keeper, Senior Keeper, and Zoo Curator at various zoological facilities. His area of research is crisis management in zoological institutions, which draws upon practical experience and training as a Rescue Diver, Hunter Safety Instructor, NRA Firearms Instructor, and Red Cross CPR/First Aid Instructor.)



Book Reviews

Incubation of Reptile Eggs

By Gunther Kohler, 2005

Translated by Valerie Haecky

Krieger Publishing Company, P.O. Box 9542, Melbourne, FL 32902-9542

Hardback \$38.95

214 pp., 148 photos & drawings

*Review by Ken Naugher
Conservation & Enrichment Manager
Montgomery Zoo, Montgomery, AL*

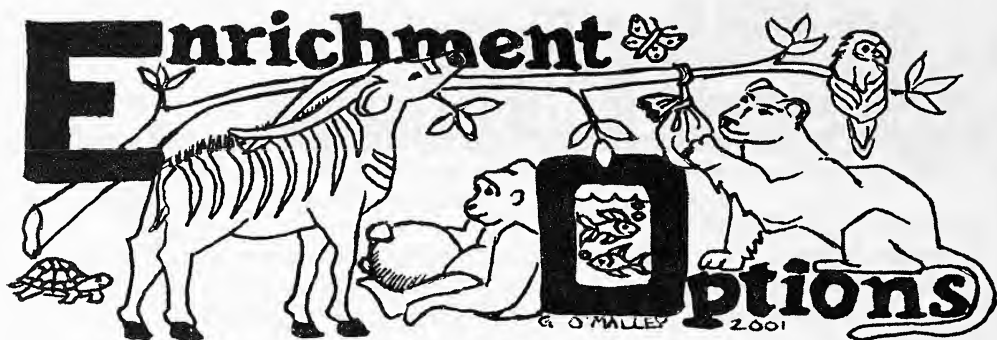
More than 80% of all extant reptiles reproduce by laying eggs. The survival of most species of reptiles is threatened by changes in their habitat, human settlement and population growth as well as many other factors. Their future will for some point in time include attempts at captive reproduction. Therefore, the development of successful incubation methods could be critical for the survival of many species. It will also be critical that experimental incubation details and methods are recorded accurately and can be easily accessed in a large database. I believe that is what the author has attempted with this book.

Much of the early data collected on reptile egg incubation was gathered using techniques that were successful with bird incubation. However, reptile eggs are drastically different from bird eggs. Bird eggs possess a fibrous ligament (chalaza) that suspends the yolk within the center of the albumin and returns the embryo to its original position when turned. Reptile eggs do not have this structure. After a reptile egg is laid, the yolk sinks to the bottom and the embryo floats to the top of the egg and attaches. If a reptile egg is turned around the horizontal axis after attachment the embryo will die.

The author does a good job of preparing the reader with general background information on reptile eggs. Topics such as egg morphology, egg development, embryonic development and hatching are highlighted in concise and easy-to-read summaries which is very helpful for a potential keeper to gain a fast education.

Reptile eggs are more permeable than bird eggs and the incubation of reptile eggs is often very intricate. The major parameters to control in order to insure successful hatching are temperature, humidity, and gas exchange. The author explores each of these issues very well and includes a detailed explanation of the influence of temperature on the duration of incubation, sex determination as well as the influence of temperature on hatchling size, growth and behavior.

Depending on the species, reptiles are highly variable in egg design and incubation requirements. Some species lay hard shell eggs, while others lay soft shelled eggs. Some tolerate large fluctuations in humidity while others only a narrow range. Size of eggs and the number of eggs laid in a single clutch is also highly variable according to species. Detailed data and notes for incubation of snakes, lizards, chelonians, crocodilians and tuataras in captivity are all covered in this volume. In fact, this is the most important aspect of this book. The three appendices include temperature dependant sex determination (TDSD) data for 63 species, changes in egg mass during incubation data for 28 species and incubation data/clutch parameters for over 1850 species. This data is supplemented with 2633 references. This book summarizes a whole treasure of information on the subject in a concise and concentrated form and will save a potential researcher or keeper from many hours of work in the library. Excellent drawings and plans to build your own incubators are included as well. This book is an encyclopedia of artificial incubation and highly recommended for all who may need to incubate reptile eggs.



EO Editors - Dawn Neptune, Utah's Hogle Zoo
and Rachel Cantrell, Disney's Animal Kingdom

Multi-Layered Enrichment Bundles

Submitted by Melba Brown, Keeper
National Zoological Park, Washington, DC

There are a host of tried and effective enrichment tools that can be modified to increase the level of stimulation for captive animals. One particular form of enrichment incorporates substrate such as hay with nuts or seeds encased in a bag. (*Illustration A*) The Smithsonian Institution's National Zoological Park utilizes cloth mealworm bags, burlap sacks, old clothes and brown paper bags to serve as enrichment containers for preferred food items. Selected primate species including *Macaca silenus*, *Macaca nigra*, and, *Lophocebus albigena* enjoy ripping the pouches open to discover the concealed treats. However, the amount of time spent engaged in this activity can be short-lived due to the simplicity of the design. This article introduces a multi-layered enrichment approach that uses different substrates, treats, scents and surrounding textiles that provide animals with more complex stimulation by presenting several levels of exploration in a contained package. (*Illustration B*)



Illustration A: Contents may contain a variety of items including but not limited to hay, shavings and edible treats such as nuts.

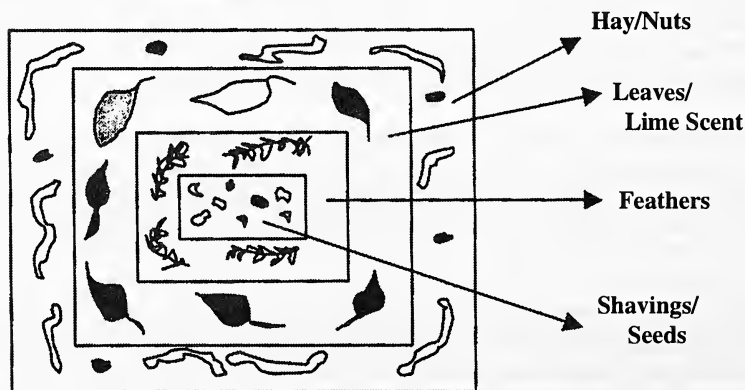


Illustration B: Multi-layered enrichment bundle with varied textiles, substrates, scents and edible treats

This multi-layered enrichment bundle is highly versatile because it can be constructed using a different fabric for each successive layer. It is physically and psychologically beneficial for captive animals to encounter forms of enrichment that cater to their tactile sense. Animals can be more fully engaged in motor activities by increasing the number of textural encounters through the use of pliable materials. This design can potentially incorporate richly-textured materials including but not limited to silk, fleece, wool, corduroy, cotton, leather, satin, suede and lace. Enrichment bundles can be made using the following dimensions from the smallest internal compartment up through the largest outer 'pillow': 19.5sq cm; 32.5sq cm; 45.5sq cm; and, 65sq cm. Many animals see color or contrasting shades and there are some amazingly eye-catching fabrics that would stimulate a number of species. A trip to any well-stocked fabric store would yield a large selection of "animal prints" that could be included using this enriching multi-layered approach. For example, prey animals (birds, frogs, insects, crustaceans, fish or small mammals) that are depicted on fabric in very bright colors would be visually compelling to primate species. Thematic textiles can be well suited to specific predatory animals.

The enrichment bundles are sewn together with a machine using a basic straight stitch or hand sewn depending on the thickness of the fabric. It is best to use cotton thread and not synthetic thread for safety purposes. The cost of materials is minimal and usually fabric stores have a hefty remnant section that can provide a surprising array of fabric at a very low cost. It is recommended that materials be washed first in a mild detergent and thoroughly rinsed and dried to remove any of the manufacturer's sizing components that may be present on the fabric's surface.

Multi-layered enrichment bundles can be filled with substrates including but not limited to alfalfa or timothy hay, wood shavings, grass clippings, feathers, shredded paper, edible leaves (ex. Red Mulberry, *Morus rubra*, Bamboo, *Arundinaria spp.*, Sugar Maple, *Acer saccharum*); or pesticide-free edible flowers or twigs. Several of these items will impart their own signature scents to the bundle but other natural scents could be added by spraying a light mist to successive layers. Citrus scents are always a good and safe choice. A mixture of 1/4 cup of water with 10 drops of essential oil of grapefruit, lemon, lime or orange makes a delicate fragrance. This added olfactory component will increase the stimulation quotient by creating complex tones for the brain to process. Standard treats may be added to one or more layers of the bundle. These edible items can include nuts, seeds, grains, dried fruits or mealworms. A number of the bundles can be made ahead of time and refrigerated until it is time to distribute them. The time spent making these multi-layered enrichment bundles would be well worth the effort and the animals will be rewarded with complex variety and much more of a challenge. Give it a try!

Ideas appearing in this column have not necessarily been tested by the editors for safety considerations. Always think ahead and use good judgement when trying new ideas. You are invited to submit material for the Enrichment Options Column. Look in the January 2004 issue of AKF for guidelines for articles acceptable for this column's format or contact the editor at akfeditor@zk.kscoxmail.com for a copy of the guidelines. Drawings and photos of enrichment are encouraged. Send to: AKF/Enrichment, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054, USA. Eds.)

Electronic Keepers: How to Keep Up With Online Resources in the 21st Century

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Zookeepers today are very different animals than their predecessors 20 years ago. Demographically, they are likely to be young, college-educated, and more often than not female (AAZK, 2005). They are also frequently computer-savvy and comfortable using the Internet. These are all important competencies because keepers are now expected to do a lot more than just clean cages; they also interact with the public, present education programs, help design exhibits, and participate actively in providing not just physical and veterinary care but also enrichment for the animals in their charge (Hancocks, 2001).

To do all this well, keepers need the best possible information. Sometimes, however, this can be a challenge, especially when budgets are tight and the information resources available at the institution are limited. How can you find good, authoritative, current information when you don't have access to expensive books, journals and databases?

Your institution probably has a library; it's a requirement if it is AZA-accredited (AZA, 2005). However, a recent survey (Barr, 2005) found that even many AZA zoos and aquariums have relatively small libraries, and often there isn't a professional librarian, or indeed anyone, staffing the library full time. Nevertheless, check out what is available; you might be pleasantly surprised, especially if there is a trained person who can show you what is accessible (not just in print but online as well).

When you need information fast or you need it to be very current and can't get to the library, you can go online yourself. However, if you go to Google®, Yahoo®, or some other search engine and just type in a search term or two, you may get several millions hits, few of them particularly relevant or reliable. Of course, there are some tricks you can use to limit and refine your search. For instance, experiment to find the most relevant terms; put phrases in quotes; use the advanced search feature; try more than one search engine; etc.

The main thing to remember is that just because something is published on the Web doesn't mean it's correct. Anybody anywhere with a computer, Internet connection and a little know-how can put up a website. (As the saying goes, on the Internet no one knows you're a dog.) How then do you evaluate what you find? Here are a few tips on what to look for:

- What sort of organization is sponsoring the site – is it an educational institution, a governmental agency, a commercial enterprise? That can tell you a lot about the **accuracy, authority and objectivity** of a site. The URL extension can help:
 - .edu for educational or research institutions
 - .org for nonprofit organizations
 - .gov for government resources
 - .int for international organizations (also different countries have their own extensions – e.g. .uk, .ca, etc.
 - .com for commercial products or commercially-sponsored sites
 - .mil for US Department of Defense
 - .net for networks
- Who is the **author/producer** of the website? What are their credentials? Try the "About" page, and if it's not clear (or you can't find an About page), that should be a warning flag. "About" should tell you whose site it is, the intended purpose, when it

was last updated. There should also be a way to contact someone. If you can't readily find this, be wary; it may just be poor design but in any case you should definitely have that kind of information in order to properly judge the reliability of the site.

- What is the **purpose** of the site? Is it primarily to share information or summarize research? To advocate a particular position on a subject? Or to advertise a product? What is the target audience? That might give you clues to the site's purposes and help you decide on its usefulness and accuracy.
- How **current** is the information – is there a date when the site was last updated? Look at the bottom. Remember, however, that the updating may not have encompassed the entire site – perhaps only a small change was made. Check for dates throughout. What about links— do the ones given work? If there are a lot of broken links, the site is not being well maintained.
- What about **functionality**? Is the site well designed, “user friendly” and easy to navigate? Are the connections intuitive or is it difficult to figure out what to click? Are the graphics attractive and helpful, or are they distracting and annoying? No matter how good the information is, if the site is poorly designed and you can't easily find what you want, people may end up frustrated and avoid using it.
- For more about evaluating Internet resources, check out <http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Evaluate.html>,

Following is a list of websites you should find helpful. Some will come up using general search engines, but some won't – they are part of the “Invisible Web” where much good information lurks hidden away from Google® and other common search engines. All sites have been checked recently and have been around a while (always a good sign), but there are no guarantees on the Internet; a site can be here today and gone or inaccessible tomorrow.

Organizations:

- AAZK, of course! <http://www.aazk.org/aazknew/>. You can find grant information, glossaries and guidelines under Committees, links to organizations, and lots more.
- American Zoo and Aquarium Association (AZA) at <http://www.aza.org>. A lot of the information is for members only but there are fact sheets, SSP listings, links, and more. Plus anyone at an AZA institution should be familiar with the organization.
- IUCN Species Conservation commission of the World Conservation Union – <http://www.iucn.org/themes/ssc/>; a primary conservation site and a good source of news. This is where you find the Red List.
- <http://www.aczm.org/> - American College of Zoological Medicine (ACZM) is an international specialty organization recognized by the American Veterinary Medical Association (AVMA) for certification of veterinarians with special expertise in zoological medicine. Website includes a reading list and links to other sites.

General sites:

- Librarians' Index to the Internet: <http://lii.org/>. There is one whole section on Animals, with the topics such as Assistance & Therapy Animals; Bones; Cephalopods; Endangered Species; Marine Biology; Paleontology; Species Identification; Wildlife Conservation; and Zoos, to mention just a few. Each has blurbs about and links to relevant sites, all selected by librarians.
- Natural History Caucus, Special Libraries Association (<http://www.lib.washington.edu/sla/>). This looks a bit dry but it has some really good links – bibliographies, reference sources (check these especially), etc. with clickable links. It definitely is worth bookmarking.
- Scirus (<http://www.scirus.com/>). This is a comprehensive science-specific search engine. It's almost too comprehensive, but you can sort by relevance or date as well as by journal or

Web results. There is so much here that your search strategy needs to be pretty focused. Try using multiple terms – e.g., “chiroptera reproduction vespertilionidae” just as you would with Google®, for instance.

- Science.gov (<http://www.science.gov/>). There is a wealth of governmental resources available on the Web, and this is a good place to start. You can select Biology and Nature and then enter a search of your own, choose a “narrower topic,” or choose a particular government website from an extensive alphabetical list.
- University of Michigan Museum of Zoology maintains the Animal Diversity Web (<http://animaldiversity.ummz.umich.edu/>). This is a good source of information on different species, not in any order. You can also click on a group of animals pictured; thus, clicking on the octopus in the upper left hand corner of the homepage takes you to Mollusca.
- The Electronic Zoo (<http://netvet.wustl.edu/ssi.htm>) – links galore.
- You can now search PBS programs by keyword or title. For example, try *Nature* at <http://www.pbs.org/wnet/nature/database.html>. There’s a section for teachers, including teacher guides; lots of links; video clips, photos, and more; a Critter Guide for different animals; etc. This can be very helpful if someone says “Gee, I saw a program on PBS about tigers...”
- Tree of Life (<http://tolweb.org/tree/phylogeny.html>). Emphasis on phylogeny but has references and links.
- University of California at Berkeley - <http://www.ucmp.berkeley.edu>. This link is to the Museum of Palaeontology but it’s an excellent, up to date site and has general stuff besides,. Go here for information about dinosaurs – and their descendents, birds! It covers all taxa and has links to many organizations worldwide.

For more specific information:

- Mammalian Species - published regularly by the American Society of Mammalogists. Each year 25-30 new accounts are issued, each of which covers a single species. These vary in length from 2-14 pages. Subscriptions are \$30.00 per year and most zoo libraries do get these; however, PDF files of the first 631 accounts are also now available free online at http://www.science.smith.edu/departments/Biology/VHAYSEN/msi/msi_intro.html.
- PrimateLit – a bibliographic database (<http://primatelit.library.wisc.edu/>). Gives citations to primate literature going way back; very easy to use. Also has lots of helpful links.
- Bat Conservation International (BCI) (<http://batcon.org>). The premier source for information on bats.
- The Cephalopod Page (<http://is.dal.ca/~ceph/TCP/index.html>). Once you get away from the main page and the annoying ink blot which follows the pointer around, there’s lots of good – and fun! - information here.
- AmphibiaWeb (<http://elab.cs.berkeley.edu/aw/>) - inspired by the global declines.
- Crocodilian, Tuatara and Turtle Species of the World - <http://www.flmnh.ufl.edu/natsci/herpetology/turtcroclst/>.
- Entomology Index of Internet Resources from Iowa State University - <http://www.ent.iastate.edu/List/>.
- The Ultimate Ungulate - <http://www.ultimateungulate.com/>. A very well-done site.
- Ichthyology Web Resources - <http://www2.biology.ualberta.ca/jackson.hp/IWR/index.php>

- Bird Life International - <http://www.birdlife.org/index.html>. A global alliance of conservation organizations concerned with birds; up-to-date news from around the world and you can search for species information.
- Searchable Ornithological Research Archive (SORA) - *The Condor* and other ornithological journals are now available and searchable for free on-line at <http://elibrary.unm.edu/sora/>.
- Poisonous plants - <http://www.ansci.cornell.edu/plants/index.html>.

And there are many more good websites - this is only a sample.

Whenever you are searching for information, whether in print or online, **always check more than one source**. That way you not only get more information but ensure greater accuracy. And if you find contradictory information, keep digging!

One final note: do check out the resources available at your local libraries. You will probably find many databases with information simply not to be found on the free web. Ask the reference librarian for help - he or she will probably be delighted to assist you! Also feel free to contact me at dorbarr@aol.com.

References:

American Association of Zoo Keepers (AAZK). Zookeeping as a career.

http://www.aazk.org/aazknew/zoo_career.asp, accessed June 15, 2005.

American Zoo and Aquarium Association (AZA). *2005 Accreditation guide and standards*, p. 46.

<http://www.aza.org/Accreditation/Documents/AccredGuide.pdf> (accessed 2 June 2005).

Barr, Dorothy. 2005. Zoo and aquarium libraries: an overview and update.

Science & Technology Libraries 25(3), p. 71-87.

Hancocks, David. 2001. *A different nature: the paradoxical world of zoos and their uncertain future*. Berkeley & Los Angeles: University of California Press.

Zoo Biology Group - A Great Resource for Zoo Professionals

Need assistance? You could try Zoo Biology, it is probably your best bet for zoo/animal information. Zoo Biology is the original discussion, Q&A group dealing with the diverse range of Zoo Sciences. First established in 1999, the Zoo Biology Group is concerned with all the disciplines involved in the running of a zoological garden - captive breeding, husbandry, cage design and construction, diets, enrichment, management, record keeping, etc. This group is restricted to zoo professionals. It is specifically a forum for professional zoo staff. Exceptions may be considered in the case of students or allied professions. A genuine commitment to both *in-situ* and *ex-situ* conservation is absolutely essential. You are encouraged to copy answers to the group. The useful archive section increases each day. There are 1400+ Zoo Biology subscribers to date and 99% of subscribers have between five and 40 years of practical zoo experience in all areas. An immense combined expertise is waiting to share their knowledge. This group is moderated. To Subscribe to Zoo Biology send an e-mail to: zoo-biology-subscribe@yahoogroups.com Leave the subject and message area blank. When you subscribe at the same time please send a separate e-mail to: peter@elvinhow.prestel.co.uk giving your brief bio. (e.g. collection, work area and interests). All details will be kept strictly confidential. Failure to do this will mean that your subscription will not be processed. This step is essential to keep the group restricted to professional zoo staff. To Unsubscribe from Zoo Biology send an e-mail to: zoo-biology-unsubscribe@yahoogroups.com Leave the subject and message area blank.

Influence of Waterborne Observers on Group Spread Among Previously Captive Spider Monkeys (*Ateles geoffroyi*)

By

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Introduction

It is important that studies be conducted with regard to human-nonhuman primate interactions in wild and captive environments in order to promote and maintain primate physical and psychological well-being. It is equally important to minimize the disruption of species-typical behaviors in such environments. At the same time, it is important to provide experiences that will create opportunities for visitors who observe primates in the wild or captive setting to form their own intellectual and emotional connections with these animals so that they will appreciate and support conservation efforts. Research findings can assist managers of wild areas, national parks, refuges, sanctuaries, zoos, wildlife parks and similar facilities where primates are located to better evaluate and manage the areas for animal well-being, and for quality visitor experiences. Such research is invaluable in those instances where formerly captive primates are reintroduced as well. Reintroduction of captive-born animals into the wild is often unsuccessful (Beck, Rapport & Price, 1994; Kleiman, 1989). There are many variables that influence the success of primate reintroductions (Beck, Castro, Kleiman, Dietz, & Rettberg-Beck, 1988). Questions regarding how nonhuman primate and human interactions affect behavior of both are important to consider in any management and conservation effort.

An important component of any conservation endeavor is education of the public. One conservation tool is ecotourism. Ecotourism has been defined in a variety of ways. For purposes of the present study, ecotourism is defined as any effort whereby the public experiences a positive interaction with a natural resource in such a manner that the health of the resource is not compromised. In addition, individuals providing the experience as either tour guides, boat operators, land owners or other related ecotourism providers, acquire some economic gain that may, in some cases, replace a former, less sustainable or even environmentally detrimental way of making a living. Furthermore, an ecotourism provider may assist a public land management agency, a refuge or sanctuary operator, or even traditional zoological facility whose mission is to protect a natural resource, to assist in maintaining the resource through economic, political and social means.

In the zoo environment, the presence of visitors has been shown to correspond to increased audience-directed behaviors and locomotory behaviors of captive primates (Mitchell, Tromborg, Kaufman, Bargabus, Simoni, & Geissler, 1992; Hosey & Druck, 1987). It has also been reported however, that the presence of groups of humans may be a source of stress in zoo primates and that different species respond in different ways to the presence of visitors (Chamove, Hosey, & Schaetzel, 1988). In addition, these researchers observed behavioral changes among captive primates that included decreased affiliative behaviors and increased instances of aggression and stereotypical behavior. Studies of observer effects on wild populations of primates have been carried out (for example Rasmussen, 1991; 1998; Tutin & Fernandez, 1991). In many situations, visitors (observers) are brought into contact with primates on foot, by various land vehicles and in some cases by watercraft. How much does the mode of observation affect behavior? More studies of how observers and associated situational variables (such as observing animals on an island from a non-motorized boat as in this study) need to be investigated for animal species reintroduced into wild and semi-wild environments as well as animals in captive contexts.

The focus of the present research was to begin to investigate the question as to how does distance of waterborne observers from a non-motorized boat influence the group spread of five previously captive spider monkeys (*Ateles geoffroyi*). Group spread was chosen as a variable for study as primates have been shown to decrease distance among members of a group when faced with perceived threat (Altmann, 1974; Rasmussen, 1983). There is also the theory put forth by Hamilton, (1971) whereby in an effort to minimize predation risk, an animal reduces the amount of unoccupied space around itself. The idea is that a predator will select and attack the nearest prey individual, ergo, if surrounded by other potential prey; the risk for being selected by the predator is reduced for the surrounded individual! This study assumes that the appearance of a boat, with people in it, quietly approaching, might be perceived as a potential threat. Such a threat might cause stress and some behavioral change. Change in group spread might be a measure of stress as a reaction to observers within various kinds of vehicles/crafts from different distances in specific environmental contexts.

Methodology

Setting

This investigation took place within the Primate Refuge and Sanctuary of Panama (PRSP). The refuge is located in Gatun Lake, Republic of Panama, in Central America. The PRSP contains a series of islands covering an area of approximately four square kilometers. The islands were set aside for the purpose of reintroducing formerly captive primate species native to the geographic area of Panama (for more detail see Tardona, 2001). The islands vary in size and to some degree in flora and local fauna. For the most part, the islands' vegetation is secondary neotropical forest approximately 60 years old. The study area was a small island called Pumita I near the Atlantic entrance to the Panama Canal. Pumita I is an elliptically shaped, 0.27 ha island with an overall length of 108m and maximum width of 26m

Subjects

The study animals consist of a group of five spider monkeys (*Ateles geoffroyi*) that were previously captive. The group consists of two juvenile females, two sub-adult males and one adult female. Sharing the island with the subject group of spider monkeys is a small group of tamarin monkeys (*Saguinas geoffroyi*), transient two- and three toed-sloths and a variety of small amphibians, reptiles and birds. Fruit bushes and trees provide wild foods; however, food is supplemented with bananas and mangoes each day at about 0600 hours. The food is delivered by a small motorized boat by one PRSP ranger.

Materials

Materials included a five-meter aluminum canoe (non-motorized boat), two Tandy® 102 computers for behavioral data collection, binoculars and one Bushnell® Yardage Pro 1000 range finder. Four homemade floats attached with nylon cord and weighted by rocks served as distance makers in the water.



Adult female spider monkey (*Ateles geoffroyi*) on Pumita I island (photo by Jennifer Kirkpatrick)

Observational Procedures

Observations were systematically taken by two observers from a canoe that served as the non-motorized boat. Observations were made from four distance points (marked by floats) on the water. The floats were placed at measured points from the approximate center of Pumita I island. The distance points chosen were 10, 20, 30 and 40 meters respectively. These distances were chosen in an attempt to systematically evaluate how the presence of the non-motorized boat at specific distances off the island would affect the proximity of the subject group of monkeys. The four distances were

in a straight line and perpendicular to the north-east shore of the island. This location was chosen because it allowed for the greatest possibility for the monkeys to observe the canoe and for observers to see the monkeys. The location was also the more likely location for an ecotourism provider to bring clients to view the island and its inhabitants.

All data were recorded using a Tandy® computer that was preprogrammed for the study from the boat. Data were recorded on the group in staggered 20-minute periods between 0700 hours and 1100 hours and then again between 1400 and 1800 hours. The time between 1100 hours and 1300 hours is a time when ecotourism operators and their clients would likely be having a lunch break. We did not want to add the confound of food presence for this study. While food presence and possible availability from visitors is an important factor to study, this variable was beyond the scope of the present investigation. It is planned that any ecotourism stops would not occur during a lunch break. In addition, because we did not want to introduce the presence of food in the canoe while making observations, logistics dictated that the hours 1200 to 1300 hours was the best time for observers to eat away from the study site as well. Furthermore, the monkeys were food provisioned

on a daily basis from a motorized boat and we did not want the monkeys to make any association of the canoe with food. Observations made it apparent that the monkeys were conditioned to associate food with the site of the PRSP provisioning ranger in a motorized boat.

Instantaneous samples were taken on group spread once every two minutes during a 20-minute observation session at one specific boat distance from the island. During each two-minute instantaneous sample, the distance between the two spider monkeys that were farthest apart, estimated to the nearest meter, was recorded. Observations were made at one

of four randomly chosen boat distance positions from the island. This resulted in 30 instantaneous samples of group



Author recording observations of spider monkeys from boat off Pumita I island. (photo by Mikkel Matsoukas)

spread at each boat distance position from the island each morning and 30 instantaneous samples of group spread per boat distance position from the island each afternoon, for a total of 60 samples per day at each distance position. Morning and afternoon sessions were done in an attempt to control for time of day variables. Over a three-week period, 18 days of observations were conducted totaling 1080 group spread estimates per distance position of the non-motorized boat from the island. It should be noted that when instantaneous samples of group spread were not being done, different behavioral observations not included in this paper, were being collected. Data were entered into the laptop computer. Incidental observations were also noted and recorded. A 10m by 10m quadrant system was imposed on a map of the island. This map, in conjunction with visual markers, and range finder helped observers to estimate distances.

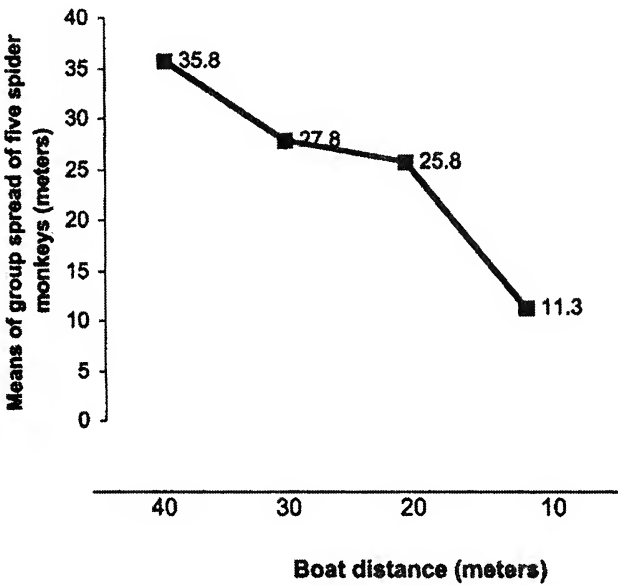
Results and Discussion

Changes in the group spread of this group of five spider monkeys appear to have been influenced by the distance of waterborne observers from a non-motorized boat. Observations suggest that these monkeys tended to move closer together and move further apart as a function of the distance between the boat and the island they inhabit. The closer the boat was, the closer the monkeys tended to be as a group on average suggested by mean group spread over 18 observation days for each distance position of the boat (Table 1 and Figure 1).

Table 1. Mean group spread (distance between two furthest individual monkeys) for each of the four distance points from the island over 18 observation days.

Non-motorized				
Boat distance	40m	30m	20m	10m
Mean Group Spread	35.8m	27.8m	25.8m	11.3m
Standard Deviation	16.1m	7.0m	7.0m	4.7m

Figure 1. Means of group spread of five spider monkeys and different distances of waterborne observers from a non-motorized boat over 18 observation days.



There did not appear to be any discernable difference between the morning and afternoon sessions in terms of group spread while the boat was at the various distance points. There was concern, however, that habituation to the boat and observers might have been a factor influencing group spread over the 18-day observation period. Although this group of spider monkeys was habituated to the presence of observers (as well as once being captive animals), they had not previously been observed from a non-motorized boat with observers for any substantial period of time in their semi-wild habitat. Rasmussen (1991) noted that a group of macaque monkeys became even more habituated despite 14 years of human observation. Means and standards deviations were computed on the first

nine days of observational data and on the latter nine days of observational data to get some idea of habituation effects. These data are presented in Table 2. While not definitive, comparing the mean values from the first nine observation days with the latter nine observation days suggests that there were some habituation effects over time, but the distance of the non-motorized boat still appeared to influence the group spread of the five spider monkeys in this study.

Table 2. First nine observation days of mean group spread (distance between two furthest individual monkeys) for each of the of four boat distance points from the island.

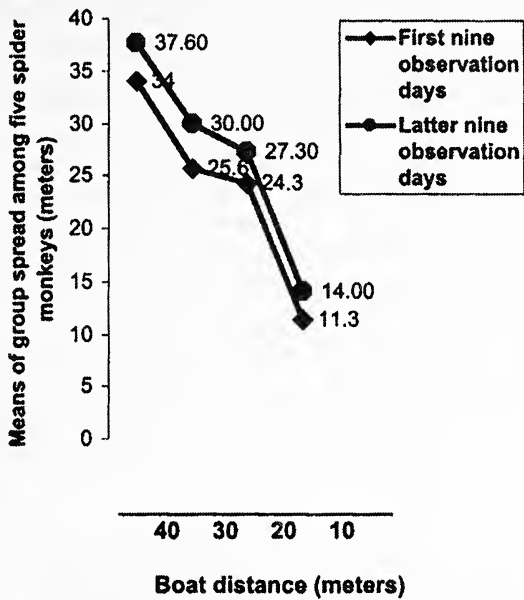
First nine observation days

Boat distance	40m	30m	20m	10m
Mean Group Spread	34.0m	25.6m	24.3m	11.3m
Standard Deviation	19.6m	9.2m	9.5m	4.8m

Latter nine observation days

Boat distance	40m	30m	20m	10m
Mean Group Spread	37.6m	30.0m	27.3m	14m
Standard Deviation	20.1m	8.3m	6.2m	6.0

Figure 2. Comparison of means of first nine observation days and latter nine observation days of group spread among five spider monkeys and different distances of waterborne observers from a non-motorized boat.



In addition to the group spread data, other behaviors were noted both quantitatively and qualitatively. Allogrooming, autogrooming, vocalizations, agnostic and stereotypy were investigated. These data are not reported here but briefly, no stereotypical behaviors were noted and very few agnostic behaviors. Observational data suggest that the distance of the observers and boat influenced grooming and autogrooming among the two juvenile and one of the sub-adult spider monkeys. It appeared that the closer the boat, the more bouts of both allogrooming and autogrooming among the three monkeys. On occasion, when the boat was at the 10-meter position, one sub-adult male would approach and display. The adult female also approached and displayed on occasion. These behaviors need further study and analysis however.

Other notable observations include instances where large and small motorized boats passed on the short northeast end of the island (in the main channel passing through the PRSP). Some of these boats would on occasion stop to view the islands. The stops were made in the channel from a distance of about 60 meters on average. Notes were taken as to how and if the monkeys appeared to react to the presence of these unpredictable instances. If the boats were simply passing, there was no discernable attention paid by any of the subjects or movements made towards or away from the sound of the boat. However, on two occasions, boats stopped near the island for approximately five minutes. In these instances, the adult female would be the first to take note of the boat's presence by turning and looking in the direction of the boat, vocalizing and then begin to move towards the area where the boat was stopped. The rest of the group would then move towards the female keeping relatively close together. This move towards the motorized boat location may be a result of conditioning of the food provisioning motorized boat. It is interesting to note that on at least four occasions, the food provisioning boat did pass close to the island but did not stop. The subjects did not appear to anticipate or react to the nearby passing of this boat as well, suggesting that the subjects were not conditioned to the specific motor sound of the food provisioning boat. In sum, it appears that it is the stopping of the motorized boat that gets some attention.

Conclusion

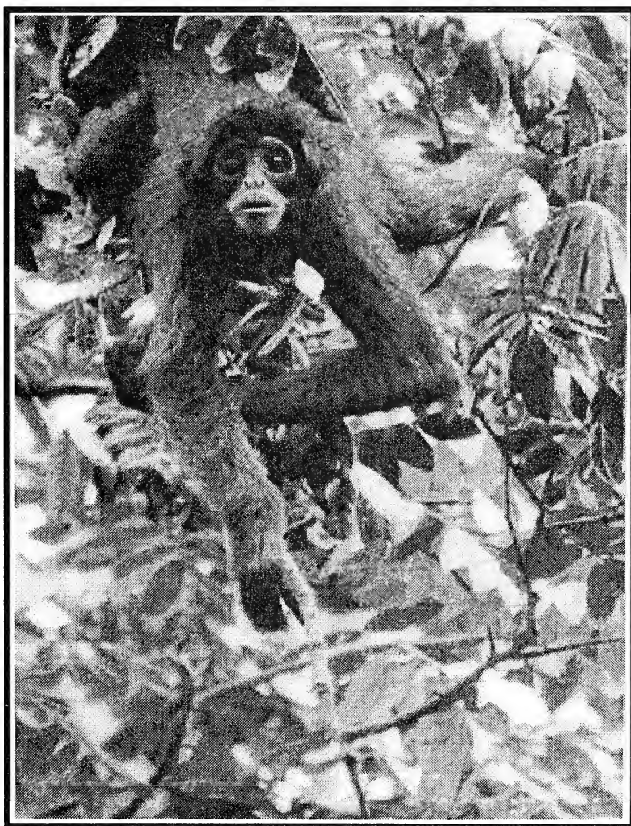
The results of this investigation suggest that the distance of waterborne observers from a non-motorized boat influenced group spread of a previously captive spider monkey group. Group spread was chosen in this preliminary investigation as a variable for study as primates have been shown to decrease distance among members of a group when faced with perceived threat (Altmann, 1974; Rasmussen, 1983; Zinner, Hindahl & Kaumanns, 2001; Rasmussen, Broekema, Chapin & Chambers, 2002). Despite the fact that the spider monkeys in this study were previously captive and habituated, they appeared to react to the non-motorized boat and observers in a manner suggesting that they perceived some potential threat. This result seems plausible since there is a fully developed theory to account for a decrease in group spread or proximity among individual animals in the face of danger (Hamilton, 1971). The literature suggests, though not conclusively, that many social behaviors of captive and free-ranging spider monkeys do not differ greatly (Rondinelli & Klein, 1976) and even spider monkeys reared as pets will recover much of their wild social behavior patterns once they are removed from most human contact (Anaya-Huertas, & Mondragon-Ceballos, 1998). Generalization of the results of the present study to other primate species and different environmental contexts are severely limited. Nonetheless, this study may offer a starting place for more sophisticated investigation and analysis. Research of this kind will become increasingly important for ecotourism operations on primate refuges and reserves and may have implications for exhibit design in zoo facilities as well. It is imperative that visitors understand and appreciate the complexities associated with animal conservation efforts in all the various contexts where wildlife can be observed. It seems especially important for successful conservation of our closest relatives in the contexts of primate-focused ecotourism (Russell, 2001).

Acknowledgement - I would like to thank Mikkel Matsoukas for help in data collection.

References

- Altman, S. A. (1974). Baboons, space, time, and energy. *American Zoologist*, 14, 221-248.
- Anaya-Huertas, C., & Mondragon-Ceballos, R. (1998). Social behavior of black-handed spider monkeys (*Ateles geoffroyi*) reared as home pets. *International Journal of Primatology*, 19, 767-784.
- Beck, B. B., Castro, I., Kleiman, D. G., Dietz, J. M. ... Rettberg-Beck, B. (1988). Preparing captive-born primates for reintroduction. *International Journal of Primatology*, 8: 426.
- Beck, B. B., Rapaport, M. R., Price, S. & Wilson, A. C. (1994). Reintroduction of captive-born animals. In: P. S. Olney, G. M. Mace & A. T. C. Feistner (Eds.), *Creative Conservation: Interactive management of wild and captive animals*. London: Chapman & Hall, pp. 265-286.
- Chamove, A., Hosey, G., & Schaetzel, P., (1988). Visitors excite primates in zoos. *Zoo Biology*, 7, 359-369.
- Hamilton, W. D. (1971). Geometry for the selfish herd. *Journal of Theoretical Biology* 31, 295-311
- Hosey, G. & Druck, P. (1987). The influence of zoo visitors on the behaviour of captive primates. *Applied Animal Behaviour Science* 18, 19-29
- Klieman, D. G., Beck, B. B., Dietz, J. M. & Dietz, L. A. (1991). Costs of a reintroduction and criteria for success: Accounting and accountability in the golden lion tamarin conservation program. *Symposium of the Zoological Society of London*. 62, 125-142.
- Mitchell, G., Tromborg, C, Kaufman, J., Bargabus, S., Simoni, R. & Geissler, V. (1992). More on the 'influence' of zoo visitors on the behaviour of captive primates. *Applied Animal Behaviour Science*. 35, 189-198.
- Rasmussen, D. R. (1983). Correlates of patterns of range use of a troop of yellow baboons (*Papio cynocephalus*). II. Spatial structure, cover density, food gathering, and individual behavior patterns. *Animal Behaviour*, 31, 834-856.

- Rasmussen, D. R. (1991). Observer influence on range use of *Macaca arctoides* after 14 years of observation. *Laboratory Primate Newsletter*, 30, 3, 6-11.
- Rasmussen, D. R. (1998). Changes in range use of Geoffroy's tamarins (*Saguinus geoffroyi*) associated with habituation to observers. *Folia Primatologica*, 69, 153-159.
- Rasmussen, D. R., Broekema, I., Chapin, B. L., & Chambers, C. M. (2002). Mantled howlers cause a decrease in distance between members of a group of rufous-naped tamarins: A field experiment. *Laboratory Primate Newsletter*, 41, 10-14.
- Rondinelli, R., & Klein, L. L. (1976). An analysis of adult social spacing tendencies and related social interactions in a colony of spider monkeys (*Ateles geoffroyi*) at the San Francisco Zoo. *Folia Primatologica*, 25, 122-142.
- Russel, C. L. (2001). Primate-focused ecotourism: Proceed with caution. *Laboratory Primate Newsletter*, 40, 4, 13-14.
- Tardona, D. R. (2001). Conservation of nonhuman primate species in Panama: Monkeys of the Primate Refuge & Sanctuary of Panama. *Animal Keepers' Forum*, 28, 6, 230-236.
- Tutin, C. E. G. & Fernandez, M. (1991). Responses of wild chimpanzees and gorillas to the arrival of primatologists: Behaviour observed during habituation. In: H. Box (Ed.): *Primate responses to environmental change*. London: Chapman & Hall, pp. 187-197.
- Zinner, D., Hindahl, J. & Kaumanns, W. (2001). Experimental intergroup encounters in lion-tailed macaques (*Macaca silenus*). *Primate Report*, 59, 77-92.



Sub-adult male spider monkey (*Ateles geoffroyi*) on Pumita I island (photo by Jennifer Kirkpatrick)

Bowling For Rhinos Recipe for Success

- ✓ Set a **date early** so that it can be advertised in as many newsletters, fliers as possible. Info should be placed in **zoo newsletters** at least four times, **zoo volunteer newsletters**, zoo guild communications, **zoo maps or fliers**, etc.
- ✓ Check with your **Chamber of Commerce** prior to setting date to find out events that could conflict. Once you choose the date, inform your Chamber of Commerce.
- ✓ Talk to your **zoo volunteers at an organized luncheon** to let them know they can join the event or sponsor someone (have your forms ready).
- ✓ Put registration fliers in an area where volunteers may see them -in their "check-in" area
- ✓ Talk to your Zoo Guild or other organization that helps at the zoo
- ✓ Have fliers that you can hand out so people can fill them out later
- ✓ **Collect door prizes.** Seek the big airline prizes 4-6 months in advance (write thank yous) Restaurants are easy to get prizes from. **Go in person with letter of donation request in hand.**
- ✓ Send out **invites to previous bowlers** (addresses listed on sponsor forms from prior year)
- ✓ Ask Blue Rhino® Gas folks in your area to join your event (& possibly sponsor)
- ✓ Ask Rhino Linings® folks in your area to join your event (& possibly sponsor)
- ✓ Let people know your event is **open to the public**
- ✓ Seek **donations** for pizzas and t-shirts
- ✓ See if your zoo will offer a **Day Off Work** for the team who raises the most \$ (ex. Graphics Team, Maint. Team, etc)
- ✓ Seek help from your zoo's **special events people, graphics**, etc. to get the word out.
- ✓ Circulate the current **list of prizes** as they come in wherever possible
- ✓ **INVITE CELEBRITIES** to bowl at your event (especially TV/radio - free advertising)
- ✓ Post info next to **rhino/elephant exhibits** about your upcoming event and how to join!
- ✓ See <http://aazkbfr.org> (NOTE: This is a **NEW URL** for the site--bookmark it now!)
- ✓ If your Chapter would like a "Lewa Promo" DVD free of charge, please contact Helen at lewausa@erols.com
- ✓ If you are going for the prize, **let potential sponsors know they could help you win the trip!**
- ✓ Send out **letters to friends and family** seeking donations.
- ✓ **Contact Patty Pearthree at:** ppear3@pear3.org (new) or 919-678-0449



Legislative/Conservation Update

Compiled by Georgann Johnston
Legislative Advisor
Sacramento, CA



Pending Federal Legislation Affecting Animals

Congress will be considering the following bills when it returns from the summer break:

Antifreeze Safety: Would require the inclusion of a bittering agent in sweet-tasting antifreeze and engine coolant to prevent poisoning of animals and children.

Canadian Seals: Would urge Canada to end its commercial seal hunt by imposing voluntary monetary and trade sanctions between the U.S. and Canada.

Primate Pets: Would prohibit interstate and foreign commerce in nonhuman primates for the pet trade.

Yellowstone Bison: Would establish a moratorium on the killing of Yellowstone bison and allow the herd to roam freely over federal lands.

More bills will be introduced at the start of the fall session, look here for updates. *Source: Humane Activist Summer 2005*

Kansas Redefines "Dogs"

In a move to placate the racing industry, the Kansas legislature passed a law stating that "dog" means any animal which is wholly or in part of the species *Canis familiaris* but does not include any greyhound. The bill was justified on the ground that greyhounds are not bred to be pets and should not be covered by companion animal protection laws. *Source: Humane Activist Summer 2005*

Population of Sea Otters Given Threatened Species Status

The southwest Alaska Distinct Population Segment of the northern sea otter (*Enhydra lutris kenyoni*) was designated as a threatened species by the USFWS and placed under the protection of the Endangered Species Act (ESA.) This means that any federal agencies that fund, authorize or conduct any activities which might affect this population of sea otters must consult with the Service under Section 7 of the Endangered Species Act before proceeding. Individuals who believe that activities they may conduct might harm these sea otters are required to contact the Service to inquire about permits.

The Service has also proposed a special rule associated with Alaska Natives' traditional and cultural uses of this population of sea otters. This special rule would align provisions relating to the creation, shipment, and sale of authentic Native handicrafts and clothing by Alaska Natives under the ESA with what is already allowed under the Marine Mammal Protection Act. The proposed rule would provide for the conservation of sea otters, while at the same time accommodating Alaska Natives' subsistence, cultural, and economic interests. *Source: USFWS Press Release 8 August 2005*

Hippo Mystery in Uganda

Since July 2004, 287 hippos have died mysteriously according to the Uganda Wildlife Authority. Tissue samples from the hippos have been submitted to laboratories around the world in an attempt to determine what is happening with the Ugandan population. The deaths to date constitute about 11% of the total population of the species in that African country.

Initially, officials believed that anthrax poisoning was a source of the deaths. However, based on prior outbreaks of this disease, less than 30 hippos should have succumbed during the same time period. The possibility of intentional poisoning of the hippos has not been ruled out by the Wildlife Authority Agency. In an attempt to determine the cause, tissue samples from deceased waterbucks, kobs, buffalo and warthogs in the same habitat as the hippos are being tested to see if they demonstrate the same strain of anthrax bacteria.

Intentional poisoning of the hippos has not been ruled out because many of the carcasses were found

to have no teeth at the time they were buried. Hippo teeth are used in some Asian societies for jewelry and bring a high price on the black market. Some Ugandan officials believe the hippos may have been poisoned by some toxic agent and then contaminated with anthrax as a cover for the "poaching" operation. *Source: Animal News: News for People Who Care About Animals May 2005*

Egyptian Moratorium on Marine Mammal Imports

The Egyptian office of CITES has issued a statement confirming that Egypt will not allow any future imports of marine mammals for public or private exhibition. The announcement comes after the importation of two male dolphins (*Tursiops truncatus*) and a sea lion (*Zalophus californianus*) to be part of a private menagerie of a wealthy Egyptian citizen. Along these same lines, a female beluga whale (*Delphinapterus leucas*) was confiscated from Dolphinella, a public exhibition, after her mate died. It is hoped that the beluga will be returned to her native waters off Russia shortly. *Source: Animal News: News for People Who Care About Animals May 2005*

Airline Incidents Now Reported to U.S. Department of Transportation

After five years of delay, the federal government adopted a final rule to implement a 2000 law requiring commercial airlines to report incidents involving the loss, injury or death of animals during transport. Until now, such incidents have simply been included in lost baggage reports. The new rule requires airlines to submit information on animal incidents to the U.S. Department of Transportation Aviation Consumer Protection Division. The reports will be available to the public through the DOT's monthly report published online at <http://airconsumer.ost.dot.gov/reports> *Source: Humane Activist May/June 2005*

Proposal to Remove Ferruginous Pygmy-Owl From Endangered Species List

The USFWS has published a proposal to remove the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) from the list of threatened and endangered species in response to a Ninth Circuit Court of Appeals' opinion. The court found that while the Arizona-based owls are discrete from other pygmy-owls, the Service did not adequately articulate that they are of sufficient biological and ecological significance to the whole pygmy-owl subspecies to qualify for listing as a distinct population segment. In addition to this proposed delisting rule, the Service will also withdraw its proposal to designate critical habitat for the pygmy owl.

Until a final decision is made, the owl remains on the list of endangered species. The Service listed only the owls in Arizona as endangered in 1997, rather than including the entire subspecies of cactus ferruginous pygmy-owls, which are located through Mexico's west coast states and a portion of the east coast of Mexico and Texas. "Our reevaluation indicates the Arizona population doesn't meet the court's standards," said Joy Nicholopoulos, USFWS Southwest Assistant Regional Director. "The proposal represents an opportunity for us to receive information from the public, interested groups and organizations."

The Court determined that the owl's endangered status was not supported by a demonstration of biological and ecological 'significance.' Under its Policy Regarding the Recognition of Distinct Vertebrate Population Segments, the Service scrutinizes a variety of considerations when determining 'significance,' including: (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon; and (3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. *Source: USFWS Press Release 2 August 2005*

Kenya to Provide Wildlife to Thailand Zoos

The Kenyan Government announced its decision to provide wildlife for the Chiang Mai Night Safari Park in Thailand causing alarm in the conservation sector.

IFAW (International Fund for Animal Welfare- <http://www.ifaw.org>) today condemned the decision by the Kenyan Government saying that it sends the wrong message to the world.

Thailand Prime Minister Thaksin Shinawatra requested wildlife for the zoo during a meeting late last year with Kenyan President Mwai Kibaki. The Chiang Mai Night Safari Park is a project launched by Shinawatra and animals from other countries have been requested from private zoos and donors. Conservationists in Kenya and the world have expressed concerns over the request. *Source: U.S. Newswire July 7, 2005*

Chapter News Notes

Kansas City AAZK Chapter

New 2005 Officers are:

President.....Angie Maxey
Vice President.....Kim Wanders
Secretary.....Erin Dowgwillo
Treasurer.....Tracy Divis
Chapter Liaison.....Joseph T. Svoke

It already has been a busy start to 2005 for our Chapter. Once again, our Bowling for Rhinos fundraiser was a success netting approximately \$4,500. This was aided by the push for new bowlers, increasing our silent auction/raffle prizes, and the continuation of t-shirt and animal painting sales.



Mid-April saw the first installment of our continuing education classes. We learned a lot on what people are looking for and are working on tailoring it to peoples' wants. It also has given us a chance to net a few more new Chapter members. We conducted a second call in May.

The rest of the year is sure to be as busy trying to create new fundraising ideas and trying to implement them.

...Joseph T. Svoke, Chapter Liaison

California Desert Chapter AAZK

We have finished our busy season here at The Living Desert and are now hunkering down for a hot summer.

Our Chapter sponsored a successful Artist in Residence weekend in the spring. Photographs, shadow boxes, cards, t-shirts, and other artwork made by members and zoo employees were sold to raise money.

Our giraffe weight raffle, held in April, was a great success as well. We sold chances to guess the total combined weight of our three reticulated giraffe. The winning guess was 5213 pounds, close to the actual combined weight of 5290. The winner took home a wonderful giraffe-themed gift basket.



The funds raised this year are being used to support the Coachella Valley Wild Bird Center, Eurasian Lynx conservation, and to send three Chapter members to the 2005 AAZK National Conference in New Orleans.

The results of our recent elections are as follows, thanks so much to the nomination/election committee for their help and support.

PresidentGrady Beck
Vice President.....Jeremy Konwiser
Secretary.....Stacey Feige
Treasurer.....Wendy Enright

San Diego AAZK Chapter

The San Diego AAZK Chapter has been exceptionally busy over the last several months - especially with fundraisers. For this year's Bowling for Rhinos, we proudly raised over \$7,000! With a scrumptious bake sale, tons of raffle prizes and silent auction pieces, everyone had a blast!

We also held our popular "Wine Steals" fundraiser at a local wine bar to benefit keeper conference and continuing education scholarships. Yet again, we had a great variety of silent auction prizes in addition to a huge amount of delicious appetizers all donated by local restaurants. With an attendance of over 50 people, we raised \$1,100!

For the first time, we held a "Keeper Jamboree" event aimed at educating keepers on a plethora of zoo topics through mini workshops. However, the main fundraising attraction of the jamboree was our rented dunk tank which many animal care managers, supervisors, veterinarians, and more agreed to be dropped into a cold abyss

(well, a few feet deep!). This amusing event kept us laughing as well as raising \$464 to be split between the Grevy Zebra Project and our local Chapter conference scholarship fund.

Educating our members with a variety of speakers always keeps us hard at work. We recently had a library workshop from one of the San Diego Zoo's librarians, Linda Coates, who updated us on our vast ability to find information via our library services, search engines, and Internet sources.



At our annual social "Evening at Joan Embery's Ranch," our members brought appetizers to feast on, explored Joan's stunning ranch, and bought tickets for raffle items to win. Dr. Walter Boyce, Director of the U.C. Davis Wildlife Health Center, and Field Biologist Michael Puzzo spoke to a crowd of over 50 people explaining the significance of tracking mountain lion activity in the region. Since 2001, satellite GPS collars have enabled Boyce and his team to track 32 mountain lions in East San Diego County. Documenting where the lions were going during their travels was just as important as what they were doing. The complex range and travel patterns of these lions made habitat protection an important issue. Boyce explained, "by working with the Anza Borrego Foundation, our research focuses on protecting the habitat by protecting managing systems and by acquiring parcels of land that are not currently protected."

Chuck Bennet, President of the Anza Borrego Foundation described the genesis of the foundation: from the Anza Borrego Committee, to what it has become today. Originally a group of concerned citizens, the committee was asked to help secure land not owned by the State Park but located within its boundary. In 2003, the mission of the Foundation changed to include supporting and augmenting the education,

interpretation, and research functions of the Colorado Desert District of California State Parks. Mark Jorgensen and Joan Embery finished the evening giving further information about the Anza Borrego Institute. Mark updated the audience on the progress of the Anza Borrego Visitor Center while Joan explained the current plans to procure parcels of land that would provide connectivity from the ocean to the desert. For more information about the Anza Borrego Foundation visit their website at: <http://theabf.org/>.

I would like to introduce our new Board;
 President..... Robert Cisneros
 Vice President..... Yvette Kemp
 Treasurer..... Nicki Boyd
 Secretary..... Laurie Brogan
 Fundraising Chair/Chapter Liaison... Matt Akel
 BFR Coordinators..... Aimee Goldcamp and
 Eileen Neff
 Newsletter Publisher and Editor... Yvette Kemp

SD AAZK Website: www.sdaazk.org
 Please check it out for event pictures,
 articles, and much more.

---Matthew Akel, Fundraising Chair &
 Chapter Liaison

North Carolina Chapter

This year was jam packed with activities. We began our year in December with the Third Annual Christmas Party. This year's theme was a Hawaiian Luau.



We added a few new fundraisers to our plates - "Build Your Own Sandwich" lunch buffet and also coloring books depicting our facility's elephant husbandry program. Each book costs a dollar and can be purchased in the gift shops. These were a hit with all the school kids!

For Earth Day we set up our Rhino Conservation booth to kickoff BFR. This was our best BFR ever with Blue Rhino® at the event. We raised about \$4000!!

We worked in the community doing highway clean-up and manned the phones at the UNCTV telethon. We look forward to another busy year.

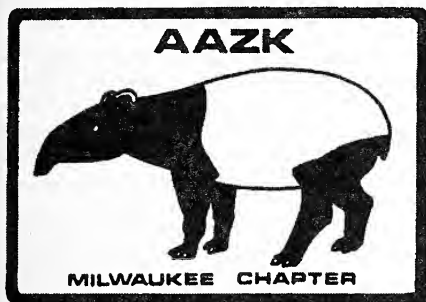
Lastly, our new officers are:

President.....Chris Shupp
 Vice President.....Bob Blohme
 Secretary/Chapter Liaison.....Shelley Lympany
 Treasurer for life.....Lucy Segerson
 Events Coordinator.....Paige Wilhoit

--Shelley Lympany, Chapter Liaison

AAZK Milwaukee Chapter

Earlier this year, we raised nearly \$400 from our Valentine's Day bake sale to help run our in-zoo operations. We also had another successful Bowling for Rhino event, in which \$1,357 was raised.



Just recently, our zoo held its annual Conservation Weekend event, and our theme this year was the endangering of wild animal populations by the pet trade. Our booth featured pet trade information on fish, reptiles, small mammals, and birds. Again, we sold grab bags with many goodies for the small and big kids, and raised \$400, which will be donated to the "Save the Wild Chinchillas INC" organization.

--Earl Conteh-Morgan, Liaison

What's your AAZK Chapter been up to? Let us know about your successful fundraisers, guest speakers, conservation projects, new officers, new logos, etc. We want to hear from you!

Send your Chapter News to the AKF Editor at:

akfeditor@zk.kscoxmail.com

St. Louis AAZK Chapter

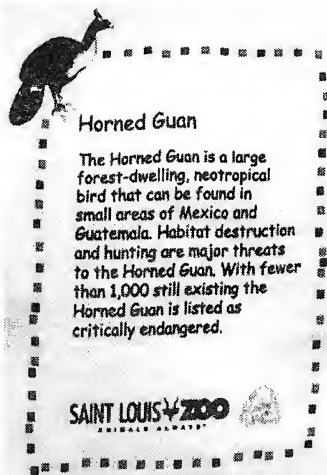
Some of our events this year included posting zoo-wide conservation though's, having a guest speaker at our monthly meetings, and continuing with our cell phone recycling program. We've sent in 1,000 phones this year.

This year's Bowling for Rhinos was a huge success! We had a local band "Brittle Jim" playing live music, a silent auction, raffle, and 50/50 raffle, and sold this year's t-shirt. We raised over \$6,000!

Our t-shirt for 2005 features the Horned Guan. Students from a local community college designed the shirt and our posters and flyers for Bowling for Rhinos. We will be selling the shirts at the New Orleans conference for the sale price of \$10 each. Part of the proceeds will be donated to the St. Louis Zoo's Center for the Conservation of the Horned Guan.



T-shirt front design



T-shirt back design

We received a Conservation Award and \$350 from the St. Louis Zoo's Conservation Department in appreciation for our conservation efforts that included our sponsorship of Bowling for Rhinos, cell phone recycling, and our support of the Balikpapan Orangutan Society and field activities of the Zoo's WildCare Institute.

--Katie Best, Chapter Liaison

Greater Houston AAZK Chapter

The Greater Houston Chapter of AAZK is having a fabulous 2005 and we would like to share some of our accomplishments.

We have held many successful fundraisers thus far, including a Spring Spin at Houston's AstroWorld where we raised nearly \$800 and a fantastic time was had by all who attended. We have also hosted multiple bake sales, aluminum can and printer cartridge recycling drives, and animal painting sales. The proceeds from the sales of animal paintings at numerous special events allowed us to purchase requested enrichment items for nearly every department in the zoo. With the two hyperbolic funnels that were recently purchased we hope to raise even more funds to contribute to keeper-selected conservation projects.



Speaking of conservation, we again actively participated with Texas Parks & Wildlife in their annual Crab Trap Cleanup and Beach Cleanup events. To increase participation possibilities, we even adopted a mile a beach for our Chapter this year. Financially GHCAAZK has contributed to several conservation projects, some of which include: Texas A&M Feline Research Program (www.ckwri.tamuk.edu/feline) concentrating on ocelots; a book drive for the Island of St. Vincent; a Maned Wolf population habitat viability assessment; and funding to assist Sea Lion Keeper Melanie Powell's participation in a California Sea Lion field study with NOAA. We were also able to purchase enrichment, education, and training items requested by our international zoo associates.

Our Chapter meetings have been enriched with presentations by speakers covering a wide range of topics including many of the conservation projects listed above. New this year we hosted several GHCAAZK "Lunch & Learn" programs where keepers bring their lunches and enjoy a presentation on topics such as proposal writing,

conservation programs, and telemetry use. We plan to have many more interesting and educational topics yet to come.

Currently we are preparing for our upcoming 15th Annual Bowling For Rhinos event and a Fall Fling Keeper Appreciation party which will include a Keeper Olympics. Recently we wrapped up a membership drive that received a tremendous response. With the year not over yet, we have several fundraisers, educational programs, and conservation projects to complete in continued efforts to grow and improve as a Chapter.

--Julie Hartell, Chapter Liaison

Oklahoma City AAZK Chapter

When they said "It can't be done," Pierre Kakule from the Dominican Republic of Congo (DRC) didn't listen. Instead, he along with a handful of others endeavored to begin a local conservation program to protect gorillas. Despite numerous and often overwhelming obstacles including retaliation from poachers, lack of funds and other resources, and minimal manpower, they did not give up. Their valiant efforts and endurance resulted in the creation of the Tayna Gorilla Reserve, which today not only protects gorillas and their habitat, but also strongly emphasizes education among the local people. Impressed by the work and accomplishments of Pierre and his staff, the Diane Fossey Gorilla Fund International elected to become a primary partner of Tayna in 2001. Their support greatly increased the opportunity for Tayna's continued success.

The following year, both organizations participated in a lecture series at the Oklahoma City Zoo. The presentations struck a chord with Debi Mangrum, an OKC Zoo gorilla keeper and long-time member of AAZK. After hearing Pierre's inspirational story and learning of the many ongoing needs for funding, Debi decided to take an active role in helping Tayna and the gorillas of DRC. Drawing from her experience as an AAZK member and BFR Chairperson, and gleaning from a plethora of ideas gathered from conferences, she developed the concept of the "Gorilla Golf Tournament."

OKC AAZK hosted its first Gorilla Golf Tournament in 2003 raising approximately \$4,000, which was sent directly to Tayna to support their invaluable work. The reward of these efforts came over the next several months as Debi received e-mails from Pierre with photos of projects supported by our funding, including infant gorillas that had been rescued from

poachers and the initial construction phases of the new Tayna Center for Conservation Biology (TCCB). But the work did not stop there. A second tournament in 2004 yielded another \$4,000, which was used to further develop the TCCB and host "Wildlife Clubs" designed for teens and young adults living in the Tayna area. The Gorilla Golf Tournament is now officially an annual event for our OKC AAZK Chapter.

It is with excitement and privilege that we prepare for Gorilla Golf (GG) 2005. Because we believe in this cause and the organization it supports, and because we have seen AAZK Chapters and members faithfully rise to conservation challenges on many occasions, we hereby issue a challenge to you, our fellow AAZK Chapters, to do one or more of the following:

- Request an instructional packet from the OKC AAZK Chapter on hosting your own GG Tournament.
- Become a hole sponsor or sponsor a golfer for the OKC GG Tournament.
- Make any size donation to our event designated for Tayna.

In 2005, we hope to double our contributions of the previous year. Gorilla Golf 2005 takes place on 19 September.



We present to you this vision and ask that you would consider partnering with us and Tayna in helping create a major conservation success! If you have questions or would like additional information, please contact Debi Mangrum at (405) 425-0259.

---OKC AAZK Officers and Members

CHAPTER LOGOS

Does your Chapter have a new logo? Please keep us up-to-date if you change your Chapter logo. Also, new Chapters are encouraged to send in a copy of their logo as soon as they adopt one. Logos may also be sent as graphic file attachments (tiff or jpeg) to the email address listed below.

We will be producing another Chapter Logo Registry in 2005, so make certain the logo in our file is your most current one. When sending in logos, please include name of the artist/designer, date logo was adopted, and what, if any, significance is in the design - animals represented, etc.

Amazon.com Users-- Don't Forget the AAZK Connection

Just a reminder that if you regularly (or even occasionally) purchase items on *amazon.com*, there is a way you can also help out the Association while you are doing your shopping. If you go to *amazon.com* from the AAZK Home Page (www.aazk.org), the Association will receive 5% of the cost of your purchase. The *amazon.com* icon is at the bottom right of the AAZK Home Page. And the percentage from purchase of goods is on all items you purchase there - books, music, etc. So next time you want to do a little online shopping at *amazon.com*, get there through the AAZK website and help out your professional organization.

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 10th of each month to: Opportunity Knocks/AKF, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054. Please include closing date for positions available, and when setting these dates keep in mind that because of bulk-mail, most readers do not receive their AKF until the middle of the month or later. There is no charge for this service and fax or e-mail listings of positions which become available close to deadline are accepted. Our Fax is (785) 273-1980; e-mail: akfeditor@zk.kscoxmail.com< Listing must be sent as MS Word attachment. To post a position on the AAZK website, have listing to email address above by the 25th of the month for posting on the first day of the following month. We are no longer located at the Topeka Zoo, so please note new address to avoid delays in processing.

Zoo Keeper – Chaffee Zoological Gardens, Fresno, CA

To obtain application materials, contact: City of Fresno Personnel Services Department, 2600 Fresno Street, Fresno, CA. 93721-3614. Phone: (559) 621-6950. Job announcements and employment application can also be obtained on the website @ www.ci.fresno.ca.us. Applicants must also complete and submit a Supplemental Application along with the City of Fresno application. Please submit application and supplemental materials on or before **30 September 2005, 4:00pm**. EOE. Zoo Keeper is the journey level class in the Zoo Keeper series at the Chaffee Zoological Gardens. Salary: \$2,312 - \$2,812/mo. Chaffee Zoo just passed a sales tax initiative that will bring new and improved animal exhibits and educational opportunities for our public. **Responsibilities:** include the care, maintenance and observation for the health and reproduction of a variety of zoo animals; recordkeeping; crating and moving animals as directed; interacting with zoo docents; and assisting zoo visitors with their questions and needs. **Requirements:** One (1) year of experience in the care, handling and feeding of animals in a zoo setting. Twelve (12) units of accredited college-level course work in animal science, zoology, biology, wildlife management, or related field may be substituted for six (6) months of the required experience. Knowledge of behavioral enhancement of exhibits, setting up breeding conditions, and specialized requirements of raising young is desirable. Additional years of the required experience is preferred. Possession of valid California Driver's License may be required at time of appointment.

Zoo Keeper - Scoville Zoo, Decatur, IL

To apply, send resumé and cover letter with three (3) references to: Dave Webster, Scovill Zoo, 71 S. Country Club Rd., Decatur, IL 62521-4470. **Closing date is 30 September 2005.** Scovill Zoo is a 15-acre AZA-accredited zoo with a full-time staff of six keepers. For more information about the zoo, go to <http://decatur-parks.org/zoo>. **Responsibilities:** Full-time swing keeper position responsible for all aspects of daily care for mammals, birds, reptiles, and amphibians; routine exhibit maintenance; as well as occasional assistance with animal presentations, guided tours, and operation of the zoo's train and carousel. **Requirements:** Requires 2-year or 4-year degree in zoology, biology, animal science, zoo animal technology, or related field; good communication skills; and the ability to work well with a diversity of people. Starting salary is \$9.00/hour with excellent benefits

Tiger Trainer - Six Flags Great Adventure, Jackson, NJ

Applicants should submit cover letter and resumé, professional letter of recommendation, and non-returnable full body photograph to: Six Flags Great Adventure, ATTN: Human Resources, P.O. Box 120, Jackson, NJ 08527. Six Flags offers great benefits and competitive wages. Six Flags is an EOE and Drug-Free Workplace. Six Flags Great Adventure's Temple of the Tiger has an immediate opening for a full-time, year-round Tiger Trainer. Six Flags provides our guests with unique free contact educational presentations featuring our Bengal and Golden Tabby Tigers, showcasing their natural behaviors and awesome capabilities. Temple of the Tiger plays a leading role in interactive education by promoting the conservation of these amazing animals. **Requirements:** A college degree in a related field (zoology, psychology, biology, etc.) is preferred as well as big cat experience. Working in and around water depths of up to 5ft is also required. The chosen applicant will possess strong verbal, cognitive and physical skills to be part of this unique trade. Dedication, enthusiasm and teamwork are essential elements of this program.

Zookeepers/Animal Caretakers - The Shell Factory Nature Park & Botanical Trail, North Fort Myers, FL

Send your resumé and a cover letter to the email address below: **Responsibilities:** Overall care & maintenance of Park's Animal Collection (lemurs, camels, alligators, serval, caracal, bobcat, birds of prey, petting zoo/domestic/farm animals, various herptiles & inverts, free-flight tropical bird aviary, etc.); daily animal diet prep, cleaning exhibits, feeding/watering all animals, exhibit maintenance & construction, planning and providing behavioral enrichment, animal physical exams, animal record keeping, educational presentations and live animal encounters for public, petting zoo attendant, covering lunch breaks/shifts in ticket booth as needed, capture/restraint/handling of animals during veterinary procedures, and making sure each visitor has a memorable visit. Starting pay is 7.50/hr. Must be able to work some nights, weekends, and most holidays. **Requirements:** Graduation from high school or G.E.D. equivalent required; college or university training or other education/training in animal husbandry preferred. At least one (1) year of experience in the care and handling of animals, other than personal or family household pets required. Additional experience with a variety of non-domestic animals such as: zoo keeping, wildlife care or management, wildlife rehabilitation, and other animal-related activities is preferred. Must be PASSIONATE about working with animals as well as enjoy working with the public (children & adults!).

Education Director - The Wolf Conservation Center in South Salem, NY

Seeking a dynamic and professional Education Director willing to wear many different hats. Salary for this full-time position will be commensurate with experience. To apply for this position please email a cover letter and resume to director@nywolf.org. No phone calls please. **Essential Functions:** 1) Teach education programs to school groups, visiting organizations, and the general public; 2) Recruit and train volunteer teachers and assistants; 3) Guide the development of education programs and curriculum; 4) Direct outreach and marketing programs to area schools, groups and partners; 5) Manage visitor feedback tools and quality control; 6) Supervise any assigned personnel, volunteers and interns; 7) Perform administrative functions, as necessary; 8) Assist Center programs, events, projects and campaigns as required; and 9) Assist in other aspects of the organization's operations including wolf captures, merchandising, and publicity. **Qualifications:** The ideal person to fill this role will be energetic, enthusiastic and passionate about environmental education and protecting the natural world. Must have demonstrated experience in teaching children and adults in formal and informal settings. Knowledge of wolves and wolf recovery in the US is desirable but not required. Demonstrated knowledge of ecology including predator/prey relationships, biodiversity, and food webs is required. Experience teaching and interpreting in the presence of animals is a plus. Qualified candidates will possess excellent organizational, written and verbal communication skills, and computer literacy. Must be knowledgeable about natural history and environmental topics. Must possess a valid driver's license. Mission: Founded in 1999, the Wolf Conservation Center (WCC) is a private, not-for-profit environmental education organization located in South Salem, NY. The WCC's mission is to promote wolf conservation by teaching about wolves, their relationship to the environment, and the human role in protecting their future. The WCC accomplishes this mission through onsite and offsite education programs emphasizing wolf biology, the ecological benefits of wolves and other large predators, and the current status of wolf recovery in the United States. The WCC also participates in the Species Survival Plan (SSP) and Recovery Plan for two critically endangered wolf species, the Mexican gray wolf (*canis lupus baileyi*) and the red wolf (*canis rufus*). The Mexican gray wolf and the red wolf are among the most rare mammals in North America. Presently there are approximately 300 Mexican gray wolves and fewer than 300 red wolves remaining in the world. It is the policy of the Wolf Conservation Center to employ the man or woman best qualified for the job regardless of race, color, religion, age, sex, sexual orientation, national origin, disability (handicap) or marital status.

Education Coordinator - Columbian Park Zoo, Lafayette, IN

Interested candidates may send cover letter and resumé to Human Resources, Lafayette City Hall, 20 N. 6th Street, Lafayette, IN 47901. Please contact Human Resources at (765) 807-1060 or email hr@lafayette.in.gov with any questions. The City of Lafayette offers a competitive salary, full benefits, and an excellent working environment. The zoo is currently embarking upon the implementation of a comprehensive master plan with construction begun in 2004. We invite the qualified candidate to join us in this exciting process. City of Lafayette is an equal opportunity employer. Columbian Park Zoo is currently seeking a dynamic self-motivated individual for the position of Education Coordinator. **Responsibilities:** This leadership position is responsible for managing educational and interpretive programming, docent program, educational outreach and on-site programming in a small zoo setting. Incumbent will supervise a small staff and assist with public presentations and lectures. **Requirements:** Excellent supervisory, task management, and communication skills required. Demonstrated ability to present public programs to a varied audience required. Prior experience with curriculum development desired. Qualified candidates will possess excellent interpersonal skills and work well in a team-oriented environment. Bachelor's degree in Biology, Education or related area, experience with exotic animals, and experience with environmental education is preferred.

Lead Animal Supervisor - Herpetology & Aquarium Dept. - Abilene Zoological Gardens, Abilene, Texas

Send resumés or direct inquiries to City of Abilene, Human Resources, P.O. Box 60, Abilene, TX 79604. Fax to (325) 676-6212, or e-mail terry.shuffield@abilenetx.com. Visit our website at www.abilenetx.com. This position will remain open until filled. EOE. Specific questions about the position can be answered by Doug Hotle/Curator, at (325) 676- 6451 or e-mail at doug.hotle@abilenetx.com. The Abilene Zoological Gardens and the City of Abilene, Texas are excited to announce that we are seeking a team-oriented individual to fill the position of Lead Animal Supervisor to oversee the Herpetology & Aquarium Department. **Responsibilities:** The position will oversee and participate in the day-to-day care and maintenance of animals in their charge, their enclosures, facilities, and personnel. There will be a strong emphasis in participation in AZA conservation programs and psychological and environmental enrichment for the animals. The selected individual will play a leading role in the design and completion of the zoo's new Herpetarium. **Requirements:** for the position include an Associates degree in one of the life sciences, at least three (3) years experience in an accredited institution, with at least one (1) year in a supervisory role. Some mammal and horticulture experience is a plus. Must have strong communication skills both verbally and in writing. Experience with venomous and other potentially dangerous reptiles is required. Knowledge of aquatics (including sea water) and their life-support systems is desirable. This is a physical position requiring the ability to climb, stoop, and crawl regularly. Must be computer literate. Must have a valid Texas driver's license, or the ability to obtain one. Any combination of experience and education may be considered. Salary for the position is \$2207.25 per month (\$1,018.73 bi-weekly) and an excellent benefits package.

Senior Reptile Keeper-Deserts Biome - Indianapolis Zoo, Indianapolis, IN

Position is open until filled. Interested candidates may send cover letter and resumé to: Human Resources

Department, Indianapolis Zoo, 1200 West Washington Street, Indianapolis, IN 46222, email jobs@indyzoo.com. EOE, Drug Free Workplace. **Responsibilities:** Responsible for the care of venomous and non-venomous snakes, a diverse group of desert lizards, invertebrates, birds, and meerkats. Experience with venomous snakes, and a basic understanding of research is preferred. The candidate will participate in the husbandry and research of our very successful *Cyclura* program. **Requirements:** Good written and oral communication skills and creativity are a must. The position and salary will be commensurate with experience. Four-year degree in life sciences preferred. However, years of experience may substitute for a Science Degree.

Keeper – Mammals – Santa Barbara Zoo, Santa Barbara, CA

Send resumé and list of references to: Human Resources, Santa Barbara Zoo, 500 Ninos Drive, Santa Barbara, CA 93103 or hr@sbzoo.org. This is a full-time, regular position. **Responsibilities:** Under general direction of Lead Keeper and Assistant Curator, the Keeper is responsible for the application of daily animal care, maintenance of exhibits, guest experience and applicable research. **Requirements:** *Education and Experience*-Bachelor's degree or graduation from two-year college program focused on captive animal husbandry; experience in routine animal husbandry as in a zoo, aquarium or closely related activity; *License, Certification, or Preferred Qualifications:* Bachelor's degree in Life Science such as Biology, Zoology, Ecology or closely related discipline is preferred; previous work experience in an AZA-accredited facility is preferred; valid driver's license with good driving record is desirable. **Knowledge, Skills and Ability:** Knowledge of animal behavior and natural history; knowledge of procedures for observation, handling/restraint, training, enrichment, reproduction, facility needs and health of animals; understanding of emergency situation procedures, specifically those involved with guest and staff safety; basic computer skills; ability to follow oral and written direction. Effective oral and written communication skills; ability to develop warm and friendly relationships at work; ability to interact courteously and respectfully with supervisors, fellow employees, volunteers, our guests; ability to exercise safe work habits while in proximity of potentially dangerous animals; awareness of, sensitivity to, and empathy with animals; ability to use abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing; and ability to bend, stretch, twist, or reach with your body, arms, and/or legs.

Senior Keeper, Herps - Santa Barbara Zoo, Santa Barbara, CA

Send resumé and list of references to: Human Resources, Santa Barbara Zoo, 500 Ninos Drive, Santa Barbara, CA 93103 or hr@sbzoo.org. This is a full-time, regular position. **Responsibilities:** Under general direction of Lead Keeper and Assistant Curator, the Senior Keeper is responsible for the application of daily animal care, maintenance of exhibits, guest experience and applicable research. **Requirements:** *Education and Experience*- Bachelor's degree or graduation from two-year college program focused on captive animal husbandry; minimum of three (3) years experience in routine animal husbandry in a zoo, aquarium or closely related activity. *License, Certification, or Preferred Qualifications:* Bachelor's degree in Life Science such as Biology, Zoology, Ecology or closely related discipline is preferred; associated with a regional zoo professional activity or association such as AAZK, AZA, or other professional association; valid driver's license with good driving record is desirable; experience in supervision, management and leadership is preferable. **Knowledge, Skills and Ability:** Knowledge of animal behavior and natural history; knowledge of procedures for observation, handling/restraint, training, enrichment, reproduction, facility needs and health of animals; understanding of emergency situation procedures, specifically those involved with guest and staff safety; ability to use abdominal and lower back muscles to support part of the body repeatedly or continuously over time without 'giving out' or fatiguing; ability to bend, stretch, twist, or reach with your body, arms, and/or legs.

Senior Keeper/Assistant Manager—The Seal Sanctuary, Mablethorpe, UK Please write with your C.V to: Glenda Allett, Manager, The Seal Sanctuary, North End, Mablethorpe, Lincolnshire, LN12 1QG, U.K. **Closing Date: 30 September 2005.** **Responsibilities:** The successful candidate will be responsible for the daily routine of a wildlife sanctuary/ small zoological garden. Duties include: 1) Leading and motivating our team of caregivers to maintain a high standard of animal husbandry; 2) Caring for a wide range of wildlife casualties; 3) Other keeper-related duties including food preparation, cleaning of enclosures, environmental enrichment, etc.; 4) Record keeping; 5) Assisting and providing cover for the manager; 6) Maintaining and improving enclosures; and 7) Helping our visitors to understand the work of the sanctuary. **Requirements:** Experience of caring for a wide range of animals is essential as well as a full driving license. The candidate would be expected to work any day of the week and occasionally at night. Benefits include an interesting and sometimes challenging lifestyle. On- site accommodation possible. Starting salary according to experience.

Zookeeper – Cougar Mountain Zoological Park, Issaquah, WA

Send resumé to: Cougar Mountain Zoo, 19525 SE 54th St., Issaquah, WA 98027; fax to 425-392-1076; or email to CougarMZoo@aol.com < **Position open until filled.** **Responsibilities:** Day-to-day management of birds and/or mammals. Will be involved in and responsible for daily routine, animal husbandry, maintenance of exhibit and off-exhibit areas, record keeping, assisting with veterinary practices and educational programs. **Requirements:** Prefer AS/BS degree in biology/zoology-related field or equivalent experience and training. Previous full-time paid experience in a zoological institution a plus. Ability to work in a harmonious manner with staff, volunteers and supervisors; work any of the seven days of the week. Salary range: \$25,000-\$30,000 plus benefits.

AAZK Membership Application

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Mail this application to: AAZK Administrative Offices, 3601 S.W. 29th, Suite 133 Topeka, KS 66614-2054. Make checks/money orders payable to AAZK, Inc. Must be in U. S. FUNDS ONLY. Membership includes a subscription to *Animal Keepers' Forum*. The membership card is good for free admission to many zoos and aquariums in the U.S. and Canada.

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NIMAL KEEPERS' O R U M



**The Journal of the American
Association of Zoo Keepers, Inc.**

OCTOBER 2005

ANIMAL KEEPERS' FORUM, 3601 S.W. 29th St., Suite 133, Topeka, KS 66614-2054
Phone: 1-800-242-4519 (U.S.) 1-800-468-1966 (Canada) FAX (785) 273-1980

October 2005
Vol. 32, No. 10

Managing Editor: Susan D. Chan • **Associate Editors:** Kayla Grams, Grand Junction, CO & Mark de Denus, Reid Park Zoo • **Enrichment Options Coordinators:** Dawn Neptune, Utah's Hogle Zoo & Rachel Cantrell, Disney's Animal Kingdom • **Legislative/Conservation Outlook Column Coordinator:** Georgann B. Johnston, Sacramento, CA. • **ABC's Column Coordinator:** Diana Guerrero, Big Bear Lake, CA • **Reactions Column Coordinator:** William K. Baker, Jr., Little Rock Zoo

Animal Keepers' Forum is published monthly by the American Association of Zoo Keepers, Inc., 3601 S.W. 29th Street, Suite 133, Topeka, KS 66614-2054. Ten dollars of each membership fee goes toward the annual publication costs of Animal Keepers' Forum. Postage paid at Topeka, KS.

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William K. Baker, Little Rock Zoo, AR; Diana Guerrero, ArkAnimals, Big Bear Lake, CA

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1974 - 2004

About the Cover....

This month's cover features a African Wild Ass (*Equus africanus*) drawn by Debi Talbot, a Keeper in the Bird House at the Smithsonian's National Zoological park, Washington, DC. The African wild ass is a critically endangered equid found in East Central Africa. They love in rocky deserts where the ground temperature exceeds 122°F. In this type of environment they must eat almost any plant food, from grasses to thorny acacia bushes, and they can go without water for several days. They have variable transverse striping on their legs like zebras, but their entire body is a buff-gray, lacking in stripes, except perhaps one vertical stripe on the shoulder. The African wild ass lives in groups that are mostly temporary and typically composed of fewer than five individuals. The groups are small because the amount of forage in any given area of the African wild ass' habitat is not adequate to support larger groups. The only stable groups are composed of a female and her offspring. Adult males are frequently solitary, but they sometimes associate with other males. Some adult males are territorial, defending a territory that contains the resources that females require (typically water and forage). Other males are tolerated within the territory's boundaries, but the resident male retains exclusive access to mate with receptive females that enter the territory. Only territorial males have been observed mating with females that are capable of breeding. Thanks, Debi!

Animal Keepers' Forum publishes original papers and news items of interest to the animal keeping profession. Non-members are welcome to submit articles for consideration. Articles should be typed or hand-printed and double-spaced. Authors are encouraged to submit their manuscripts on a disk as well as in hard copy form. Manuscripts submitted either on disk or electronically as attachments to an email should be submitted in Microsoft WORD. All illustrations, graphs, charts and tables should be clearly marked, in final form and should fit in a page size **no greater than 5.5" x 8.5"** (14cm x 22cm). Literature used should be cited in the text (Brown, 1986) and alphabetically in the final bibliography. Avoid footnotes. Include scientific name (as per ISIS) the first time an animal name is used. Thereafter use common name. Use metric system for weights and measurements (standard equivalents may be noted in parenthesis). Use the continental dating system (day-month-year). Times should be listed as per the 24-hour clock (0800, 1630 hrs. etc.). Glossy black and white **or** color prints (minimum size 3" x 5" [8cm x 14cm]) are accepted. Clearly marked captions should accompany photos. Please list photo credit on back of photo. Photographs may be submitted electronically as either JPEG or TIFF file attachments.

Articles sent to Animal Keepers' Forum will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for AKF. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the editor. The editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or email contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone 1-800-242-4519 (US); 1-800-468-1966 (Canada); FAX (785) 273-1980; email is akfeditor@zk.kscsxmail.com

Deadline for each regular issue is the 10th of the preceding month.

Dedicated issues may have separate deadline dates and will be noted by the editor.

Articles printed do not necessarily reflect the opinions of the AKF staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

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E-Mail Addresses: You may reach Barbara Manspeaker at AAZK Administrative Offices at: aazkoffice@zk.kscsxmail.com You may reach Susan Chan and Animal Keepers' Forum at: akfeditor@zk.kscsxmail.com

AAZK Website Address: www.aazk.org

BFR Website: <http://aazkbfr.org>

Scoops & Scuttlebutt



ASAG Small Grants Program Announcement

The Avian Scientific Advisory Group (ASAG) wishes to announce it will again this year offer grants to bird keepers and working bird supervisors to attend the upcoming AZA Regional Conference that hosts the ASAG sponsored workshops. That conference will be held in Jacksonville, Florida in late March of 2006. Grant recipients will receive funding for registration, airfare, lodging and meals in order to attend the conference and in particular two full day workshops on topics relevant to avian collection management.

This year's ASAG Workshop topics will be 1) Shorebird Husbandry and Management and 2) Use of Behavioral Conditioning with Birds. Grant recipients will also be able to attend the ASAG general business meeting held at this conference as well as open meetings being held by several avian TAGs.

The ASAG Small Grants Program seeks to recruit and build capacity in the next generation of zoo bird curators and avian scientific program managers. The grants will target bird keepers who have demonstrated leadership potential, self-motivation and initiative.

Grant program guidelines and application forms are available on the AAZK website at www.aazk.org under the Reminder Board. Please feel free to contact Ken Reininger, Curator of Birds at the North Carolina Zoo with any questions you might have at Ken.Reininger@ncmail.net

Study Endangered Cats in Mexico

The Dallas Zoo is currently accepting applications for its 18th Wildlife Research Expedition to the Los Ebanos Ranch in rural northeastern Mexico. From December 3-16, a small group of expedition participants will study the behavior and ecology of small, endangered cats and birds of prey.

The Dallas Zoo's Wildlife Research Expeditions offer paying volunteers a chance to work in the field on research projects or conservation programs. Five to seven individuals will be chosen to participate in the research study in Mexico.

The participants, working with field biologists and local assistants, will help capture and radio-collar ocelots and jaguarundis and will aid in radio-tracking the cats to determine their home ranges, habitat use and population densities. Populations of small wild cat species have declined dramatically in the United States and Mexico because of human encroachment and loss of habitat. This research study will help scientists develop a conservation strategy to preserve these cats in the wild.

A second element of this Wildlife Research Expedition will be capturing raptors, or birds of prey, to assess their migratory patterns and nesting behaviors. Participants will take data on the birds, band them and release them.

The study site is the privately-owned Los Ebanos Ranch on the Gulf of Mexico in Tamaulipas. The ranch includes 2,000 acres of tropical deciduous forest, 500 acres of mangrove forest, 1,500 acres of grassland and more than two miles of undeveloped beach. The ranch is also home to many species of exotic birds, including Amazon parrots.

The trip will be led by Sue Booth-Binczik, research technician at the Dallas Zoo. The on-site project leader is field biologist Arturo Caso, who has been studying endangered cats in Mexico for many years.

No experience is necessary; on-site training will be provided. Conditions on the ranch are luxurious for a field study! Participants will stay in attractive lakeside bungalows with toilets, showers and electricity. The ranch cooks prepare three meals each day, and water on the ranch is purified well water.

The cost of the trip is \$1,700, including roundtrip transportation to the study site from Harlingen, Texas. (Participants must get to Harlingen on their own.) Some trip expenses are tax-deductible. For more information, contact Dr. Booth-Binczik at 214-671-0777 or sbooth@mail.ci.dallas.tx.us.

North Carolina Zoo AAZK Chapter Awarded In Situ Conservation Prize

The Center for Ecosystem Survival has awarded the 2005 Conservation Prize to the North Carolina AAZK Chapter, Zoo and Zoological Society for their leadership role in saving precious biological diversity and for creating a conservation partnership that evokes strong emotions with a compelling call to action to save endangered tropical rainforest and wild ocean habitat *in-situ*. The award was originally scheduled for presentation at the AAZK National Conference to be held in New Orleans, but the conference was cancelled due to Hurricane Katrina. The award was mailed to N.C. Zoo Director Dr. David Jones.

Since 1992, the N.C. Zoo's 15-member AAZK Chapter has sponsored two Conservation Parking Meters that enable zoo visitors to contribute pocket change to rain forest protection. The entire staff of the North Carolina Zoo has demonstrated an exceptional, and long-term commitment to conservation, raising funds for the purchase and protection of critical habitat in Guanacaste Conservation Area and the Pedras Blancas National Park/Osa Peninsula in Costa Rica. North Carolina Zoo is linking the public with the wild, offering them the opportunity to preserve biological processes so important for the survival of species and their threatened homes. Norman Gershenz, Director of the Center for Ecosystem Survival noted, "the staff of the North Carolina Zoo and Zoological Society represents a hope and catalyst for conservation in the 21st century."

The Center for Ecosystem Survival's Conservation Prize was created in 1993 to honor zoos, aquaria and individuals who have exhibited an "exceptional and extraordinary" contribution for saving wildlife and wild places in nature. To date, through the efforts of 128 zoological institutions and 2800 schools nationwide reaching more than 80 million children and adults, the Center For Ecosystem Survival has raised awareness and more than \$3.2 million for ecosystem protection to save threatened and endangered habitat world wide.

R.A.T.E. Workshop Issues 2nd Call for Papers

The Reptile and Amphibian Training and Enrichment Steering Committee is issuing the second call for papers for the 2005 National Workshop. After three very successful local meetings, the first national workshop will be hosted by Disney's Animal Kingdom in Orlando FL on 8-10 December 2005.

Interested persons are invited to submit an abstract for a paper or poster presentation. Topic of interest include, but is not limited to, training and enrichment for reptiles and amphibians for husbandry management. Abstracts should be limited to one or two paragraphs. Please include the following information with each abstract submission:

Name/Title of each presenter

Institution

Presentation or Poster

Title of paper presentation or poster

Mailing address and e-mail address

Audio/visual needs

Short bio of presenter (presentations only, for introduction)

**Abstract deadline
has been extended to:
31 October 2005**

Mail abstracts **by 31 October 2005** to: Vance Alford and Andre Daneault, P.O. Box 10,000, Lake Buena Vista, FL 32830-1000 or e-mail to: vance.c.alford@disney.com and andre.j.daneault@disney.com

The workshop will be held at Radisson Resort Parkway, 2900 Parkway Blvd., Kissimmee, FL 34747; (407) 396-700 or 1-800-333-3333. Attendees should request "WDW Reptile Program" to ensure the designated room rate. Reservations must be made **by 7 November 2005** to receive the group rate of Single or Double Room - \$89.00. Reservations after this date will be subject to current hotel rates.

Center for North American Herpetology PDF Library

The Center for North American Herpetology is pleased to announce that over 265 titles from numerous journals/periodicals are now available as gratis downloads from the CNAH PDF Library. The list is searchable by author, year date, journal, and subject. Users can read a title using Adobe Acrobat Reader or download it for printing using Adobe Acrobat. This permits herpetologists to download and print only those titles of specific interest to them. We continue to encourage authors to add titles that deal with the North American (north of Mexico) herpetofauna; any appropriate titles dealing

with higher level are also acceptable regardless of geographic coverage. CNAH continues to make available this academic service to herpetologists for the first time in the history of our profession. Colleagues who have already posted their pdfs on the CNAH PDF Library are encouraged to check their entries for spelling and accessibility. The CNAH PDF Library can be accessed at http://www.cnah.org/cnah_pdf.asp For more information, contact: Joseph T. Collins, CNAH Director, at jcollins@ku.edu

New Rainforest Publication Debuts

The Borneo Orangutan Survival Foundation highly recommends the outstanding publication "Rainforests" - The world's first magazine (as far as we know!) of its kind, devoted to rainforests throughout the world. Available now, Edition 1, features articles on Sumatran and Bornean orangutans, Sumatran elephants, the bird trade in Indonesia, primates in the Cameroon and lots more from around the world. 36-pages, full color. Future editions will cover just about every subject related to rainforests. "Rainforests" is published by Nature Alert Ltd. A non-profit company managed on a voluntary basis. The magazine is completely independent of any NGO organization.

"Our objective is to help other organizations and individuals raise awareness of rainforests. We will publicize the wonderful work done by the many conservation groups and individuals throughout the world," says Sean Whyte, Editor.

Individual copies are UK £3; Europe £6; Rest of the World £7; Subscriptions (4 editions) £10 Rest of Europe £15 RTW £20. Available online at <http://www.naturealert.org> or by mail: Nature Alert, PO Box 3830, Bath BA1 3WX England.

Inquiries: sw@naturealert.com

Conference 2006 Opens Website

AAZK will be heading to Chicago in the fall of the 2006 for its National Conference. It is being hosted by the Lincoln Park AAZK Chapter and the Lincoln Park Zoo. They now have a website up and will be adding information on the upcoming conference as it becomes available. The website address is www.aazk2006.org There is also a link to this site from the main AAZK website (www.aazk.org).

2005 BFR Trip Winners Announced

Please Note E-mail and Website Changes for Bowling for Rhinos

BFR Coordinator Patty Pearthree has announced the following four individuals as the top money raisers in the Bowling for Rhinos program for this year:

- Chrislyn Newton, Oklahoma City Zoo raised \$18,074.06 - Lewa Wildlife Conservancy Trip
- Crystal Derusha, Utah's Hogle Zoo raised \$14,000 - Lewa Wildlife Conservancy Trip
- Jessica Scallan, Tulsa Zoo raised \$9,000 - Indonesia Sanctuary Trip
- Alex Vasquez, Dallas Zoo raised \$8,706 - Indonesia Sanctuary Trip

Chapters are reminded that if they have not turned in their BFR money as yet, they need to send it to Patty ASAP

You are also asked to update your email address book for Patty Pearthree, Coordinator for AAZK's Bowling for Rhinos program. Patty may now be reached at ppear3@pear3.org You are asked to use this email address if you need to contact Patty concerning your planned BFR event, or if you have questions about holding an event. Also, please make note that the Bowling for Rhinos website has changed its URL. The correct web address is <http://www.aazkbfr.org>

Web Sites Worth a Visit

Gorilla Haven
<http://www.gorilla-haven.org/>

Zoo Peru
<http://www.zooperu.com/>

The Primata - <http://members.tripod.com/cacajao/index.html>

AAZK International Outreach Committee Seeks Chairperson

The International Outreach Committee (IOC) is seeking applicants for committee chairperson. To apply, please send a resume and cover letter to Shane Good at sjg@clevelandmetroparks.com

Job Description *Essential Functions*

- Works with the International Outreach Committee members and Board Oversight in coordinating AAZK's outreach endeavors
- Coordinates Project M.A.R.C. (*Making A Realistic Contribution*)
- Coordinates innovative workshops for the professional development of keepers, particularly in developing countries
- Works with AAZK's steering committee members on the International Congress of Zookeeping (ICZ)
- Appoints and supervises the Latin American Liaison
- Writes written reports of the committee's progress to the AAZK Board of Directors
- Facilitates committee meetings and workshops
- Presents written and/or oral updates to the membership
- Manages the International Outreach Committee's annual budget

Qualifications

- Minimum three (3) years membership in good standing, AAZK, Inc.
- Minimum three (3) years professional experience in zoo animal care
- Has the ability to make international contacts in the zoological field and work with a culturally diverse team. Promotes the professional development and conservation goals of AAZK and its international partners.
- Strong written and oral communication skills
- Strong computer skills
- Demonstrated ability to manage projects, solve problems, work with a diverse team, and meet deadlines
- Fluency in additional languages, particularly Spanish, will be helpful, but is not necessary.

Three AAZK Animal Data Transfer Forms Now Available Online !!

The American Association of Zoo Keepers, Inc. encourages all zoos and other animal care facilities to utilize the following data transfer forms whenever they are shipping an animal between facilities. Providing this information to the receiving facility will ease the transition of a new animal into the collection and provide vital information to receiving staff. With the greater emphasis on enrichment and training at all AZA-accredited facilities, this information will prove especially important in providing continuity and consistency when an animal is shipped.

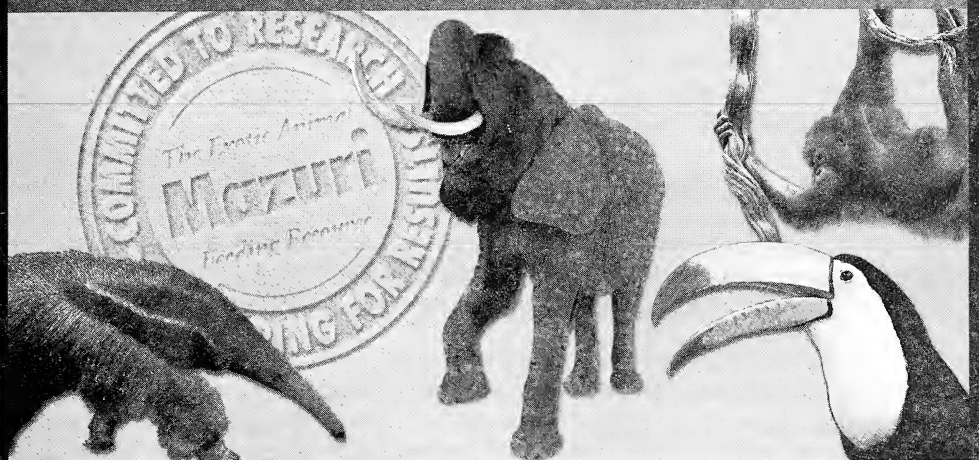
All three forms are now available in downloadable pdf format at www.aazk.org

All collection managers are asked to include all three of the forms where applicable whenever an animal is shipped. THREE copies of each form should be sent with the animal being shipped. At the receiving institution these copies should be distributed to the following staff:

a) Curator b) Keeper who will be caring for the animal c) Zoo files and/or veterinarian

1. The original **Animal Data Transfer Form** provides information on the animal, its diet, reproductive history, medical and physical husbandry information, etc. This form is one page in length.
2. The **Enrichment Data Transfer Form** provides information on the animal's behavioral history, and data on what types of enrichment have been utilized and their success or failure with the particular animal. This form is two pages in length.
3. The **Operant Conditioning Data Transfer Form** provides background information on any training that has occurred with the animal, training schedules, types of training, animal's reaction to training, etc. This form is two pages in length.

We all seek to provide the best and most professional care possible for the animals in our collections. Using the three AAZK data transfer forms will help provide receiving institution staff with the tools to make this possible. Your cooperation and participation is encouraged and appreciated. These forms are provided as a professional courtesy by AAZK, Inc.



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From the Executive Director

At 4:00am, driving to the airport on my way to New Orleans, I saw a falling star. Being an apprehensive flier at best, I silently wished for a safe journey to and from the Conference. Within 36 hours, that wish became very prophetic.

We were very aware of the hurricane in the Gulf as we started our Board meeting on Friday night, but she was a Category 1, and with the entire Gulf of Mexico to choose from, what were the chances Katrina would zero in on New Orleans as the prime target?

By Saturday morning, the answer was evident. With help and advice from the staff of the Sheraton New Orleans, and acting upon the recommendations of the City and State leaders, we made the decision to cancel the Conference and evacuate the City of New Orleans. Delegates to the Conference, who were already checked in to the hotel, were given notice to evacuate, or in the worse case scenario, stay in the hotel and ride out the storm. Fortunately, being a Saturday, only about 40% of the 227 registered delegates were in the hotel.

Some delegates were trapped by circumstance. They were either in the air when the decision to cancel was made, or they could not change or locate flights out of the City. Most of the delegates were able to make arrangements to leave. About 25 or so members could not, and the Audubon Institute rode to the rescue. Transportation and drivers were graciously provided, and for the next 12 hours, they fought standstill traffic, wind and rain all the way to Memphis. Kathy, Jeff and Kelly – your passengers and all of AAZK are in your debt.

Everyone is well aware of the devastation wrought by Katrina in Louisiana, Mississippi and Alabama. Please remember that in order to meet printing deadlines, I write this about six weeks before you read it, so what I'm about to say, you should already know. AAZK is working with our partners at AZA to staff relief labor parties and provide physical assistance when and where needed. AAZK will be working with our Chapters to provide financial relief to the multitude of keepers and aquarists who lost their homes or who need assistance in the recovery process.

Regarding various aspects of the conference such as refunds, registration fee donation, papers and posters, auction items, the bidding process for future conferences, etc., I promise you we will address each question as quickly as possible. We must re-establish normal communications with the Audubon AAZK Chapter and involve them in the decision process, and normal communication, a low priority as I write this, are at least four to six weeks away. Next year's host, the Lincoln Park AAZK Chapter, will also have a seat at the decision table.

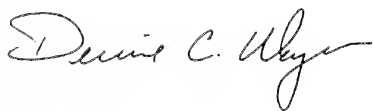
In all, AAZK and the zoo and aquarium profession survived a very close call. The toll on the staff members of the affected facilities and their families has yet to be tabulated. By donating to AAZK, you are assured that your donations will support our fellow keepers, aquarists, horticulturists, and maintenance personnel – the full realm of professional colleagues – in the Gulf Coast region. Watch the AAZK web site for continuing updates, and I thank you in advance because I know what this Association can do in times of crisis.

Ed Hansen
AAZK Executive Director
Tucson, AZ

From the President

Usually I look forward every year to the annual AAZK conference as a time to renew old friendships and make new ones. This year I was a bit reticent about going and was unsure why that was. Apparently I was reserved with good reason as hurricane Katrina had other plans for the Gulf Coast area. As Ed mentioned the Board was very aware of the hurricane as we started our meeting on Friday evening and it quickly became apparent on Saturday that this conference would not happen. A few days later as I watched the devastation wrought by Katrina on my television I couldn't help but think of those AAZK members and other employees of the zoo and aquariums in the Gulf Coast region and what it must be like for them to be affected by this storm. My thoughts and prayers are with them still.

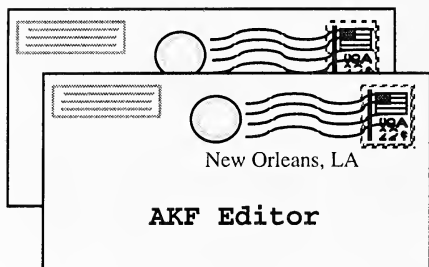
Lines of communication were quickly established between AAZK and AZA to do whatever we could possibly do to help our fellow zoo and aquarium family members get through this. Recovery will take a long time and while I do not wish to repeat what Ed said it is extremely important that you continue to donate whatever you can to aid those zoo and aquarium professionals affected by Katrina. I'm continually amazed at what this Association can do collectively. YOU are an unbelievable asset to the zoo/aquarium community because not only do you give 110% daily to the animals in your care but you go above and beyond to help your fellow professionals when they are in need. You have done, are doing, and will do great things. Of that I have no doubt. I'm privileged to be part of this community. THANK YOU for all you have done and will do. Take care and be safe.



Denise C. Wagner
President, AAZK Inc.
The Phoenix Zoo, Phoenix, AZ

Amazon.com Users -- Don't Forget the AAZK Connection

Just a reminder that if you regularly (or even occasionally) purchase items on *amazon.com*, there is a way you can also help out the Association while you are doing your shopping. If you go to *amazon.com* from the AAZK Home Page (www.aazk.org), the Association will receive 5% of the cost of your purchase. The *amazon.com* icon is at the bottom right of the AAZK Home Page. And the percentage from purchase of goods is on all items you purchase there - books, music, etc. So next time you want to do a little online shopping at *amazon.com*, get there through the AAZK website and help out your professional organization.



Letters to the Editor

Readers are welcome to comment upon material published in Animal Keepers' Forum through a Letter to the Editor. We welcome a free exchange of ideas benefiting the zoo keeping profession.

Storm Story - Making the best out of a really bad situation

There were six Toronto Zoo AAZK Chapter members scheduled to attend the conference in New Orleans. Harry Hofauer and I flew in on Friday afternoon, 26th August. Blue skies, hot Southern air, we were really looking forward to a great week. Marveling at the superb location of the hotel, we ventured into the French Quarter, sampling the music, food and culture of that great city. Around midnight, Eric Cole, Vernon and Nicole Presley arrived.

Saturday morning was bright and clear. We had booked a swamp tour on the Internet and at 0700 we hopped on the bus for Bayou Barataria. We had a great tour through Cypress swamps and old canals with plenty of alligators and native birds to set the Louisiana tone and kick off the week. As we were returning to the bus, the boatman asked us when we were leaving town. What he told us about the impending hurricane heading our way and what would be the aftermath was chillingly correct. We had just got there, we would find out more on our return to the hotel and the hospitality suite/AAZK Conference H.Q.

Kathy Leblanc, who along with many other Audubon Nature Institute staff, had worked very hard for three years to put this thing together, told us that the Aquarium had closed and the Icebreaker for Sunday had been cancelled. A decision on the entire conference would be forthcoming.

I took off for Confederate Memorial Hall, the Louisiana State Museum, and the New Orleans School of Cooking. There were donations to be made, reference searches and ingredients to be procured, and I had waited a long time for this trip. I was the AAZK President in 1990 when New Orleans had first been conference hosts, and I had been seduced by the unique charm of the city and, as a re-enactor, had developed a keen interest in the history of the State of Louisiana.

On returning to the hotel, many delegates were in the lobby checking out, the conference was cancelled. Sadly we accepted the fact and discussed our next step. Do we stay and sit out the storm or do we get the hell out of there? By this time, Andrea Drost (back in Toronto,) had cancelled her Sunday flight. We decided to leave in the morning. As we talked we noticed Mark deDenus (ex Winnipeg) now Tucson keeper in the line to check *into* the hotel. It took some convincing for him to believe the bad news.

It should come as no surprise that Zookeepers, (some of them Canadians,) were among the last people to party on Bourbon Street before Katrina came to town.

Sunday morning as Mayor Ray Nagin on CNN told us to flee ("You should have left yesterday!") we hurriedly packed, ate breakfast and checked out of the hotel. Gathering in the lobby were several keepers making arrangements to evacuate. Toronto and Kansas City keepers managed to secure two taxi minivans. They wanted \$1,000 to take us to Houston. Before we committed, Kathy Leblanc told us that she had two large vehicles going to Memphis and that there was room for as many delegates as possible. It was a wonderful gesture from folks who had to leave their homes and their zoo behind.

It was a long journey to Memphis. It took us a couple of hours to get away from the city. Traffic was very slow as thousands of people evacuated New Orleans. We were in a zoo convoy of three vehicles and finally reached our destination shortly after midnight. The Audubon folks had secured motel rooms as best they could.

The next day, Mark got a flight back to Tucson. Jacque Blessington, Heidi Fisher, Angie Maxey and J.T. Svoke of Kansas City, Kathy and the Toronto crew visited Memphis Zoo. We said our goodbyes to Kathy as K.C and T.O. keepers rented vehicles and took off for St. Louis and the zoo. We thought a road trip home might help salvage some of the spirit and camaraderie of an AAZK Conference and ease the shock of what was happening back in New Orleans. We received behind the scenes tours in all three zoos we visited and the staff were, as usual, welcoming and friendly.

After a day in St. Louis, we parted company. Kansas City was off to the west and we set off for Columbus and finally Pittsburg where we visited the zoo before flying back to Canada.

We will be forever thankful to Kathy Leblanc, Jeff from ACRES and all the other Audubon Nature Institute staff.

Oliver Claffey,
Toronto Zoo
2005/9/14

2005 AAZK Grant Recipients Announced

The AAZK Grants Committee has announced the following individuals as recipients of grants awarded for 2005:

Keeper Course Grant (to attend AAZK/AZA school) - Bethany Ricci, Utica Zoo, \$1000.00

Conservation, Preservation & Restoration Grant: Janice Reed-Smith, Columbus Zoo, \$1,000.00 - Otters in Africa - Primary Education Initiative for Children in Kenya, Tanzania and Uganda - for creation, printing and distribution of conservation-themed coloring books to primary school children in these countries.

Research Grant - Vicki Vroble and Carolyn Maddox, Houston Zoo, \$960.00 - North American Otter Latrine Site Survey in East Texas - Initiating a distribution survey of river otter latrines to establish population and distribution.

Professional Travel Grant - Jay Pratte, Zoo Atlanta, \$500.00 - Chengdu Giant Panda Research Base in Chengdu - Teach staff basic operant conditioning techniques and help develop management ideas for successful breeding program to use at Zoo Atlanta.

Professional Travel Grant - Jodi Neely, \$500.00 - Enriching the Lives of Captive Baboons - Enkosini Sanctuary, South Africa - Conducting comparative research on the effects of supplemental formula vs. mother's breast milk; work as primate keeper at the sanctuary, hand-rearing infants, study methods used for release back into the wild.

The AAZK Grants Committee is now being Chaired by Shelly Roach of the Columbus Zoo. This committee oversees the administration of the following granting programs:

The Geraldine Meyer/AAZK Professional Travel Grants; Advances in Animal Keeping Course; Conservation, Preservation, and Restoration Grant; and Research Grant.

Information about these grant opportunities and application forms for the AAZK grant program are available on the AAZK website (www.aazk.org) or by contacting the Grants Committee Chair Shelly Roach (shelly.roach@columbuszoo.org).

Coming Events

60th Annual Conference of the World Association of Zoos and Aquariums (WAZA) - 2-6 October, 2005. Hosted by the Wildlife Conservation Society at the Marriott Marquis in Manhattan, NY. Attendance restricted to WAZA members. For more information, visit the Conference website at www.waza2005.org

Zoological Registrar's Association (ZRA) 2005 Annual Conference - 5-8 October 2005 in Tacoma, WA. Hosted by the Point Defiance Zoo & Aquarium. For more information contact Marla Waddell at (253) 404-3654 or email registrar@pdza.org or see their website at or see their website at <http://www.zra.homestead.com/conference.html>

26th Annual Elephant Managers Association Workshop - 5-9 October, 2005 in Portland, OR. Hosted by the Oregon Zoo. Pre-conference trip will be to the Point Defiance Zoo (5 Oct.); the post-conference trip will be to Wildlife Safari (10 Oct.). For more information please visit their website at <http://www.oregonzoo.org/ElephantWorkshop> or email elephants@metro.dst.or.us

2005 Annual Conference of the American Association of Zoo Veterinarians - 15-21 October, 2005 in Omaha, NE. For information contact Wilbur B. Amand, VMD, AAZV Exec. Dir., 6 North Pennell Rd., Media, PA 19063; Ph - (610) 892-4812; email aazv@aol.com; or check the website at www.aazv.org

Reptile and Amphibian Training and Enrichment (R.A.T.E.) Workshop - 8-10 December 2005 at Disney's Animal Kingdom, Lake Buena Vista, FL. For more information about R.A.T.E., the national workshop and/or the listserve and how you might participate, please contact Andy Daneault (andre.j.daneault@disney.com) or Vance Alford (vance.c.alford@disney.com).

16th Biennial Conference on the Biology of Marine Mammals - 12-15 December 2005 in San Diego, CA. Organized by The Society for Marine Mammalogy. For information see <http://www.marinemammalogy.org/2005%20SMM%20Biennial.html>

Third International Tapir Symposium 26-31 January 2006 in Buenos Aires, Argentina. For info email tapirtalk@uol.com.br

14th Annual Conference of The International Association of Avian Trainers and Educators (IAATE) - 15-18 February 2006 in Nashville, TN. This year's theme is "Soaring to New Heights". The conference is being hosted by the Nashville Zoo at Grassmere, at the Nashville Sheraton Downtown Hotel. For further information, please visit www.iaate.org. You can also contact Alicia Douglas (aliciadouglas78@yahoo.com) or Jacqueline Walker (jwalker@nashvillezoo.org).

AZA Eastern Regional Conference - 26 March - 1 April 2006 - hosted by the Jacksonville Zoo, Jacksonville, FL. See <http://www.aza.org/ConfWork/AboutRegWork/#fut>

AZA Western Regional Conference - 24-29 April 2006 hosted by Vancouver Aquarium in Vancouver, British Columbia. See <http://www.aza.org/ConfWork/AboutRegWork/#fut>

Second International Congress of Zookeeping (ICZ) 7-11 May 2006 in Gold Coast, Queensland, Australia. Visit website: <http://www.iczoo.org> for latest information. See information on Second Call for Papers in the May 2005 issue of *AKF*.

2006 International Gorilla Workshop - 23-26 June 2006 at Paignton Zoo, Devon, England. Paignton Zoo will be host. We would like to invite gorilla workers from all disciplines to register. Deadline for submission of abstracts for presentation and for early registration is **31 December 2005**. Further info available at <http://www.paigntonzoo.org.uk/gorillas/gorillaworkshop.htm>

21st Congress of the International Primatological Society - 26-30 June 2006 in Entebbe, Uganda. For further info: wolupot@yahoo.com

First European Congress of Conservation Biology - 23-27 August 2006. Please visit <http://www.eccb2006.org> for details and to register for new information.

33rd AAZK National Conference - 15-20 September 2006. Hosted by the Lincoln Park Zoo AAZK Chapter and the Lincoln Park Zoo, Chicago, IL. See information at their website www.aazk2006.org

AZA Annual Conference - 25 - 30 September 2006. Hosted by Busch Gardens, Florida Aquarium, & Lowry Park Zoo Tampa, FL. See information at their website <http://www.aza.org/ConfWork/AboutAnnualConf/#fut>

18th IZE Biennial Conference. International Zoo Educators Association - 25-30 September 2006. Hosted by the National Zoo of South Africa, Pretoria, South Africa. For more information visit <http://www.izea.net>

6th International Parrot Convention - 27-30 September 2006 at Loro Parque, Tenerife. For more info visit <http://www.loroparque-fundacion.org/>

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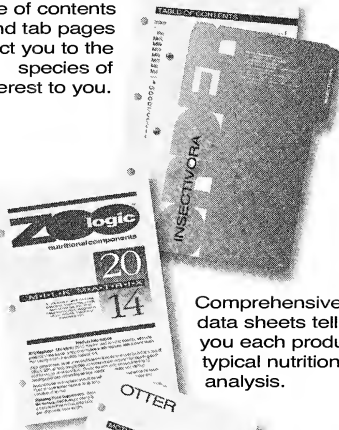


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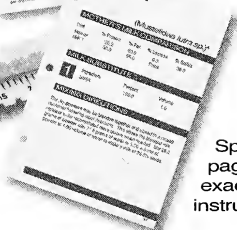
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2005 AAZK/AKF Award Recipients

The following are recipients of awards that were to have been presented at the 31st Annual AAZK Conference in New Orleans, LA. Because the conference had to be cancelled due to Hurricane Katrina, the awards are to be mailed to the recipients. Our congratulations to the recipients and we are sorry we were not able to present these in person before the assembled conference attendees. The *Certificates of Recognition and Appreciation* are given by the AAZK Board of Directors. The *AKF Excellence in Journalism Awards* are selected by the journal's editorial staff. All other listed awards are selected by the AAZK Awards Committee from nominations received from the membership.

Certificate of Merit for Zoo Keeper Education Award presented to

The Birmingham Zoo for the development of courses for the benefit of all zoo staff and specifically those developed for keepers to learn basic techniques for animal care. Also noted is the reimbursement program for formal education and attendance at AZA-sponsored schools.

Lee Houts Excellence in Enrichment Award presented to

Hilda Tersz, The Phoenix Zoo, Phoenix, AZ for the development of a formal enrichment program for the zoo's animals. For creating, developing and implementing a comprehensive Behavioral Management Program that outlines the philosophy and standards for animal training; a general Behavioral Enrichment Protocol, and a Primate Behavioral Enrichment Program. She has also developed enrichment outreach programs for the general public, records and catalogs behavioral enrichment pictures and video footage, reorganized enrichment cataloging by transferring all behavioral enrichment data to an Excel* program, and recruited and organized volunteers to create behavioral enrichment items.

Certificates of Appreciation presented to

The Audubon Zoo - AAZK 2005 National Conference Host Institution

Heidi Bissel, Memphis Zoo, for assistance in developing
the Mazuri Excellence in Animal Nutrition Award

Certificates of Recognition presented to

Bruce Elkins, Indianapolis Zoo, for service on the AAZK Board of Directors

Jeannette Beranger for service as the International Outreach Chair

Jan Reed-Smith, Columbus Zoo, for service as the Grants Committee Chair

Beth Stark, The Toledo Zoo, for service as the Animal Training Committee Chair

Amy Burgess, Disney's Animal Kingdom, for service as the Chair of the Enrichment Committee

Kathryn LeBlanc, Audubon Zoo, AAZK 2005 National Conference Chair

Virgil Baird, The Toledo Zoo, for outstanding service to the Bowling for Rhinos Program

Distinguished Service Plaque

New Orleans Chapter of AAZK - AAZK 2005 Conference Host Chapter

Excellence in Journalism Awards

“Treatment and Recovery of Traumatic Septic Arthritis
of the Fetlock of a 1.0 Reticulated Giraffe”

published in 2004 AAZK Conference Proceedings

Amy Phelps

Oakland Zoo, Oakland, CA

“Methods for Achieving a Successful Birth & Weaning of a
Southern Tamandua at the Cincinnati Zoo & Botanical Garden”

published in 2004 AAZK Conference Proceedings

Amy K. Thompson

Cincinnati Zoo, Cincinnati, OH

“Cultured Critters: Raising Live Foods for Small Fish and Amphibians”

published in 2004 AAZK Conference Proceedings

Bob Huntington

The Dallas Aquarium at Fair Park

Dallas, TX

“How Maintaining Pregnancy and Lamb Growth Weights in Bighorn Sheep

Led to Improved Herd Management at the Dallas Zoo”

published in May 2005 Animal Keepers' Forum and 2004 AAZK Conference Proceedings

Elizabeth A. Fischer

Dallas Zoo, Dallas, TX

“Bubblegum and Shoelaces: Working with Animal in an Older Facility”

published in August 2004 Animal Keepers' Forum

Kay Buffamonte and Tara Brody

The Philadelphia Zoo, Philadelphia, PA

“Cat Got Your Tongue? Learning to Work with a Tongue-less Snow Leopard”

published in 2004 AAZK Conference Proceedings

Susan Shepard

Houston Zoo, Houston, TX

Outstanding Cover Art Award

American Alligator (Alligator mississippiensis)

Cover for May 2005 Animal Keepers' Forum

Debi Talbot

National Zoological Park, Washington, DC



Animal Training Committee AAZK, Inc.

Tools of the Trade: Adapting the Environment

By
Jay Pratte, Giant Panda Keeper
Zoo Atlanta, Atlanta, GA
&
AAZK, Inc. Animal Training Committee

You have developed some training experience, and are getting a feel for your own potential, as well as the animals with which you are working. Your charges know a few behaviours. You are ready for some big goals; it's time for injection training, blood draws, clean urine sample collection, or an ultrasound. So you stop and look around the building or habitat, and wonder, "Exactly *where* am I supposed to get the lion to put his tail through for a draw? the cassowary to safely give me a hip for an injection? the panda to present her abdomen for an ultrasound?" These are questions many trainers face at some point. You have developed the method, you are confident in your skills and animals' willingness to progress, but you don't have an accessible area to implement the training. Presented here are a few ideas about how to address this situation, and some examples of successful adaptations.

Look Over Work Area with "New Eyes"

Problem solving techniques can guide you through this process, which starts with assessing the current situation (Stark, 2001). Walk around the habitat and animal holding areas. Keep in mind **WHAT** your goal is, not **WHERE** you think it should be. Yes, an elephant squeeze would be helpful, but is it going to happen within the next year? Many trainers find themselves in a situation where the department does not have the budget to modify a facility, or afford a squeeze cage. Altering an area might reduce its structural integrity or compromise safety. This does not mean that you cannot train desired behaviours. Observe what already exists in the environment in a new light. If you ask an elephant to station by a slightly opened hydraulic door before shifting, can the same animal be trained to put an ear through the opening, and receive rewards with its trunk? Can you build a bench or place a log for an animal to stand/sit on so that the desired piece of anatomy is accessible? Many animals have been trained in facilities that have no functional squeeze cage or fancy training areas in the original layout. Solutions can be developed by assessing what is currently present and action planning remedies. Ask other keepers or trainers to look over the area and provide their input on ways to use your current surroundings.

Design Small "In-House" Possibilities

As you scrutinize the environment, consider potential modifications that could be made to facilitate your training goals, without becoming a major budgetary or construction concern. A small frame with a hinged or sliding door can be constructed and installed by most zoo maintenance facilities. The giant panda keepers at Zoo Atlanta designed two separate training panels to replace mesh panels that made accessing the animals difficult (Figure 1). One was constructed in-house, and the second by a construction company with which one of the keeper's had ties (the project was a tax write-off for the company). The panels have made meeting training goals infinitely easier.

Inquire into the maintenance staff's capabilities, or ask mechanically minded keepers if they can help build your idea (I recently designed a blood sleeve for giant pandas, and a fellow keeper ingeniously constructed the whole thing himself (Fig.2). Decide if there is an existing area that could be easily modified, and design how you would like it to be altered. Try to outline the lowest materials and costs necessary, and maintain high safety and containment standards. Some examples

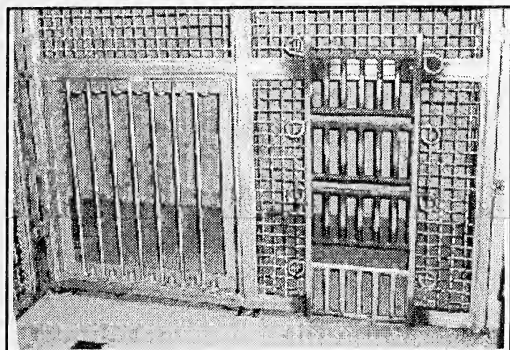


Figure 1: Modification of a door or cage front can provide a more accessible training area.

are: small holes cut in shift tunnels, sliding or hinged access doors in off-exhibit holding, replacing a mesh panel with bars, building a small box with a door to train a Turaco to station and crate. Any of these might aid your training efforts, and can be presented to zoo managers in a concise, positive way. Be prepared to answer questions about your idea regarding the modifications, as well as why you feel they are necessary for your training. Remain positive about your training successes, and present shaping plans or detailed goals to support your modification ideas.

Go for the Gusto...

There are some keepers who will be lucky enough to have the finances to think big. Maybe the zoo just received a huge grant for a new exhibit, or you are going to be involved in helping design and build a new holding facility. If you have the potential to incorporate training devices and aids into your area, use the opportunity wisely. Research what other zoos have done, ask questions through listservs or at conferences about what has worked for other keepers and trainers. Gather your resources and present them along with your proposal (Fig.3). The more thought you put into your proposal, the more credibility you will earn. With training now becoming part of routine husbandry, facilities are often constructed with training in mind. But be proactive when the opportunity exists to provide input. If your big idea does not come to fruition, then you can still fall back on modifying what you already have, or using your environment to your advantage.

As a trainer you are limited only by your vision, and this need not apply solely to operant conditioning techniques. Use your imagination, and draw upon the experiences of others to find ways to use your environment as a tool to your advantage. In the end, increasing your skills in creative problem solving and adaptability will provide solid benefits for you, your animals, and your training program.

Reference:

Stark, Beth. 2001. *Behavioral Problem Solving in the Zoo Using the Principles of Problem Based Learning*. AAZK Conference Proceedings: 217-224.

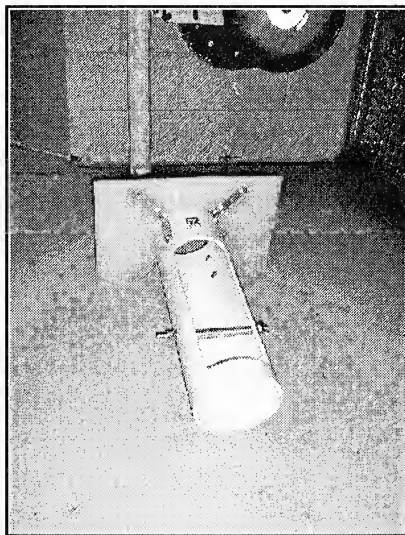
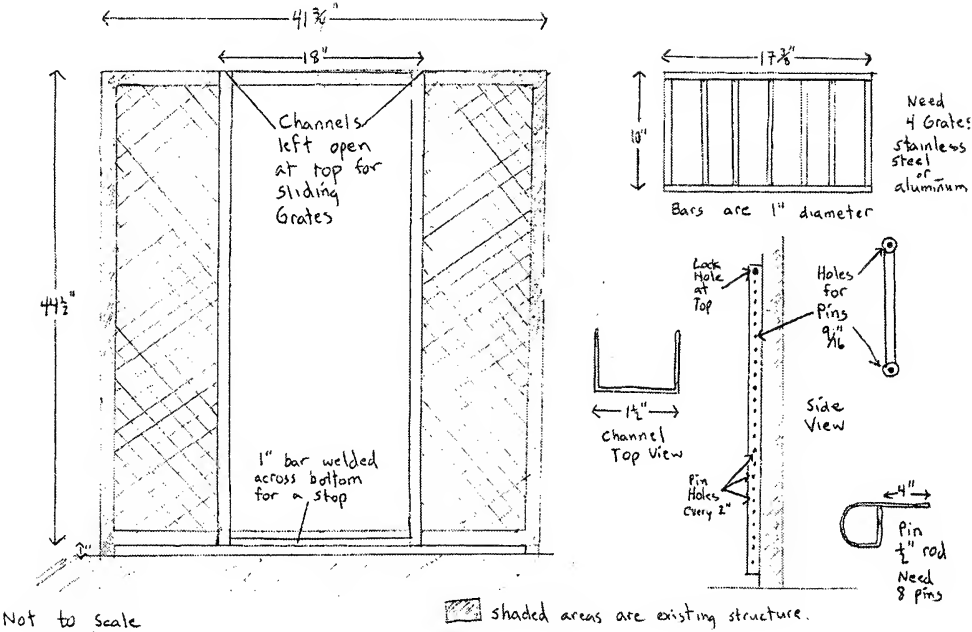
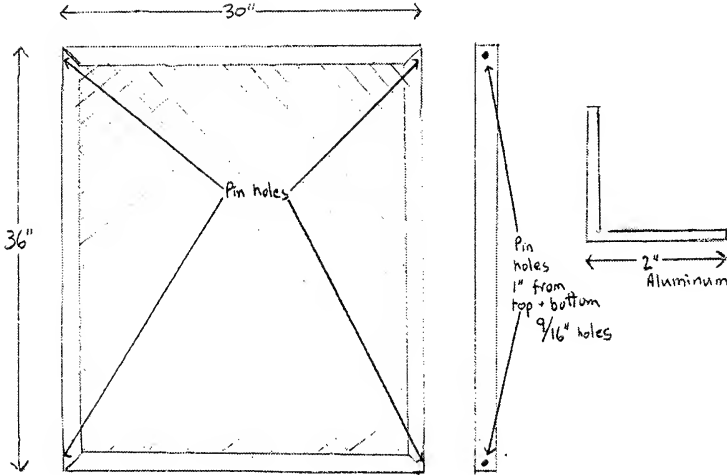


Fig. 2: Giant panda blood sleeve.

Fig. 3: Modification proposal schematics.



Back Support



ASAG Call for Papers

The AZA's Avian Advisory Scientific Group (ASAG) is again hosting two avian workshops at the spring AZA meeting in Jacksonville, FL from 26 March - 1 April 2006. They are seeking abstracts on two distinct topics. Please see details below.

Avian Behavioral Husbandry: Targeting a New Future is the title of the first workshop. They are looking for papers regarding specific case histories in which behavioral conditioning made a significant difference in your husbandry/medical procedures, interactive experiences or successful breeding. Also they would like to explore what a successful training program is, starting this program, training staff in conditioning, ect. Finally, they would like to explore the future of behavioral conditioning and what might be possible. Please send your abstracts to Sherry.Branch@SeaWorld.com <<mailto:Sherry.Branch@SeaWorld.com>> by **1 November 2005** or call with questions at 407-363-2361

The Charadriiformes TAG is hosting a workshop on **Shorebird and Alcid Husbandry and Conservation**. This workshop will focus on husbandry advances and exhibits of native shorebirds and alcids as well as highlight some of the conservation work that is currently being done. Do you have an interesting topic that you would like to present at this workshop? If you do contact Kim Smith, Curator of Birds, Milwaukee County Zoo; (414)256-5457; e-mail: ksmith@milwcnty.com by **1 November 2005**.

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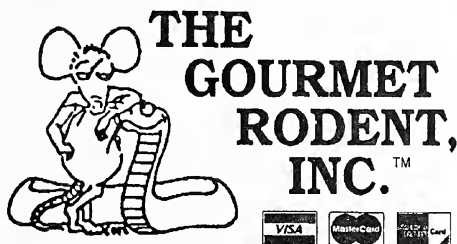
AAZK Announces New Members

New Professionals Members

Rachael Urbanek, **Catoctin Wildlife Refuge & Zoo (MD)**; Theresa Andrews, Matt Price, Bryan Emberton, Amanda Dailey, Kelly M. Savage and Emily Ann Hi Hon, **Disney's Animal Kingdom (FL)**; Christine Rogers, no zoo listed (FL); Jacqueline Hailey, no zoo listed (FL); Maria Kasper, **Busch Gardens (FL)**; Mary Griffin, **Santa Fe Community College Teaching Zoo (FL)**; Joanne Zeliff, **Silver Springs Wildlife Park (FL)**; Hall B. Whitaker III, **Nashville Zoo (TN)**; Jonathan Mikosz, **International Animal Exchange (MI)**; Gary Reynard II, **Sedgwick County Zoo (KS)**; Greg Clements, no zoo listed (NE); Janelle Lemke, **International Exotic Feline Sanctuary (TX)**; Dena Faulnker, **Animal Edutainment (TX)**; Molly Hurst, **Fossil Rim Wildlife Center (TX)**; Megan Patschke, Carolyn Maddox, Amy Simpson, Andrew Godambe, Trisha Killgrove, Megan Neal, Jackie Hasing, Sabrina Shanon, Elizabeth Neipert, Melanie Powell and Ann L. Chaney, **Houston Zoo (TX)**; Liz Bayne, **Austin Zoo (TX)**; Leilani O'Brien, **The Phoenix Zoo (AZ)**; Renee Barnett, **The Living Desert (CA)**; and Christine Wester, **PAWS/Performing Animal Welfare Society (CA)**.

New Contributing Members

Joan Rog, Volunteer
Cleveland Metroparks Zoo, Cleveland, OH



RATS AND MICE

Bill & Marcia Brant

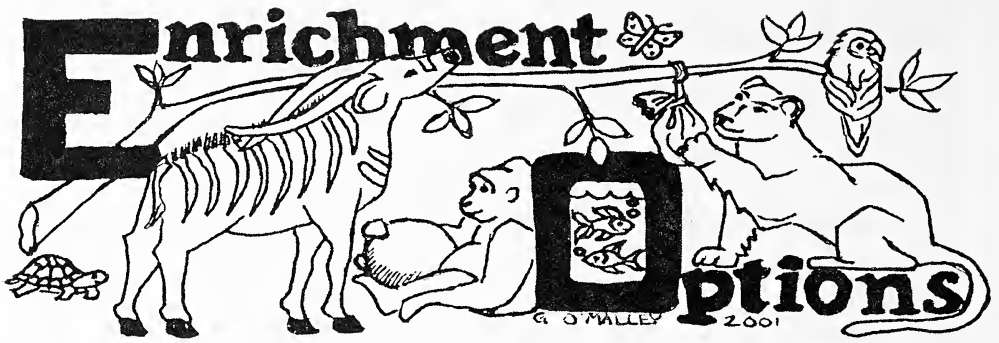
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*EO Editors - Dawn Neptune, Utah's Hogle Zoo
and Rachel Cantrell, Disney's Animal Kingdom*

Fire Hose Punching Bag

*By Tarah Bedrossian, Senior Mammal Keeper/Chair of Enrichment Committee
Detroit Zoo, Royal Oak, Michigan*

The purpose of the fire hose punching bag is to encourage exercise, by play and foraging. Donated fire hoses are used to make a shape of a punching bag, which can be filled with straw, hay, or browse with or without treats. The bag can be left unchained or hung for more of a challenge. The interwoven hose pieces provide texture for a bear to grip, swat, and shake to get treats separate from straw, or a primate to cling, swing, and search through. Also useful for elephants to manipulate with their trunks to pull out hay or browse. Although the fire hose is unnatural looking itself, it may be possible to dye or texture it to look more natural.

Items needed:

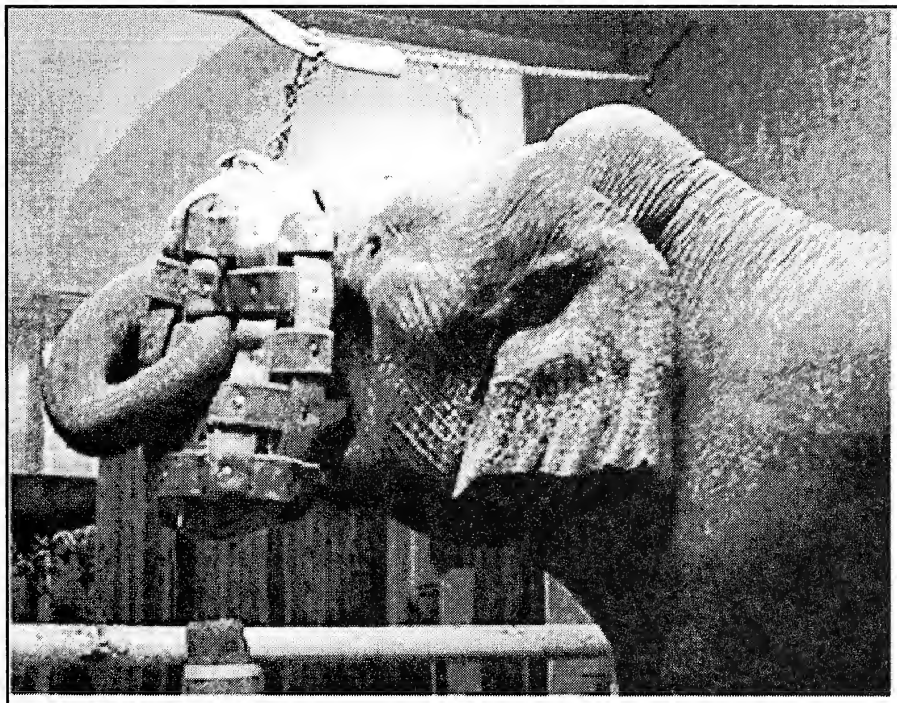
- Fire hose
- Approximately 50, 1.5 inch carriage bolts (2 inches long), nuts, washers (stainless steel if possible)
- One wing nut (1.5 inch)
- One 1.5 inch carriage bolt (3 inches long) for every hose piece you want to weave into the main structure. In the pictures included with this article, 5 of these bolts were needed.
- One heavy duty eye-bolt if desired, for hanging, or one 6-inch long carriage bolt.
- Drill with 1/4 inch bit
- Knife (to cut hose)
- Strong fingers and a total of 6-8 hours for constructing

How to make it:

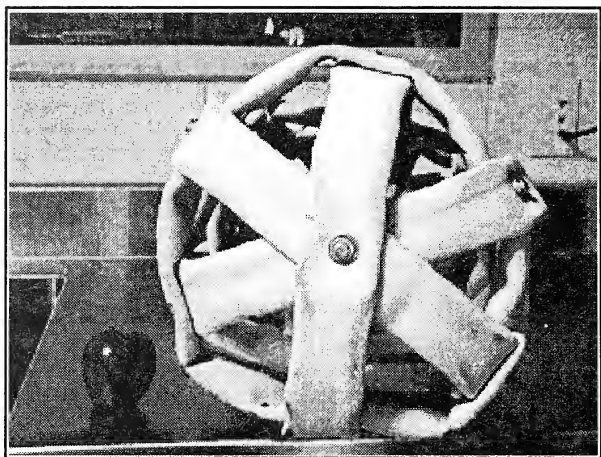
- Decide how big you want the bag to be, keeping in mind how heavy the hose can be.
- Cut at least 4 pieces to the length desired, these pieces will be secured at the middle of each piece. Therefore the piece should be cut double the length of the overall desired height of the bag. The 1.5 inch hose toy pictured has 4ft hose pieces. The regular fire-hose toy, pictured with the elephant, has 5ft hose pieces.
- Cut at least 5 pieces of hose 2/3 the length of the first 4 pieces
- Lay the longer pieces in a asterisk * formation, use the drill to get through the hose, put your first bolt through the center of all 4 hose pieces.
- One at a time take each 2/3 piece, bolt to the inside of the bag, weave it around each long piece (of the asterisk shape) both ends of the 2/3 piece should be held in place by the same bolt (forming a circle). Bolt each hose overlap in place. Don't weave the circles too close together if you intend to put treats in it. The animals may not be able to get the treats and become discouraged.
- Continue weaving and bolting each of 5 pieces (or more! Keep the frame of the structure in even numbers or the weaving won't match up right) This will take a lot of finger/hand strength and time.

- When you run out of hose pieces the top is secured similar to the bottom, only secured with the wing nut for opening and closing to pack the bag. Instead of a bolt, an eye-bolt can be used, if preferred, for easy hanging. Otherwise chain can be wrapped around any section for a variety of hanging positions.
- Cut any excess hose ends.
- Brush off any materials from construction and wash.

Once your fire hose punching bag is completed, try filling it with a variety of bedding, treats, ice treats, scents, browse, or toys! Hang it at different heights, or let it loose. Since the fire hose is hard to manipulate, the incentive may have to be big, using favorite food items may increase use. The 1.5 inch hose toy has been used successfully with ruffed lemurs and ring tailed lemurs. The regular fire-hose toy was a huge success as a “hay net” type of toy for the Asian elephants. The stiff structure of the hose makes it more challenging then the usual hay nets. Initially the elephants tossed it up in the air, punched and swung at it trying to get the treats out. The first day it took the two elephants almost four hours to empty it completely! Now the elephants hold on to the bag with their trunks and use their finger to manipulate the hose to get out treats. Whole produce, stuffed paper bags, alfalfa, hay, and browse were all great incentives. The bag seems to provide a good amount of trunk exercise while utilizing problem-solving skills. Over time the elephants have become experts at emptying the bag, however it still takes them up to an hour to empty it completely. The bag has been abused by the elephants for up to two weeks without sustaining any damage!

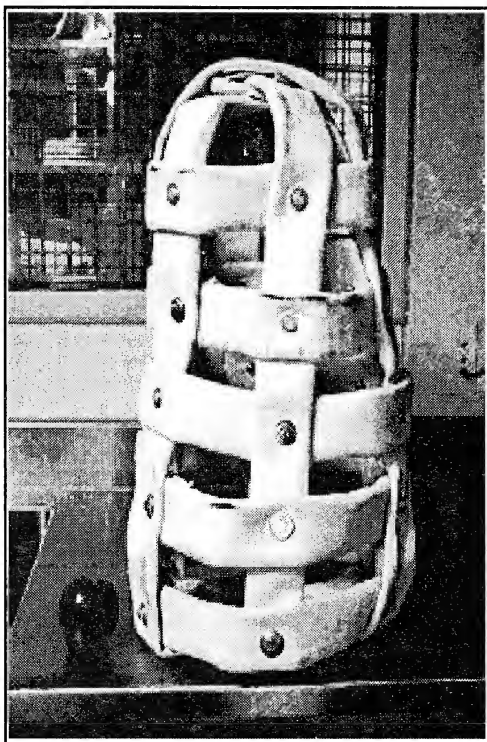


0.1 Asian elephant Wanda enjoys a treat-filled fire hose punching bag.

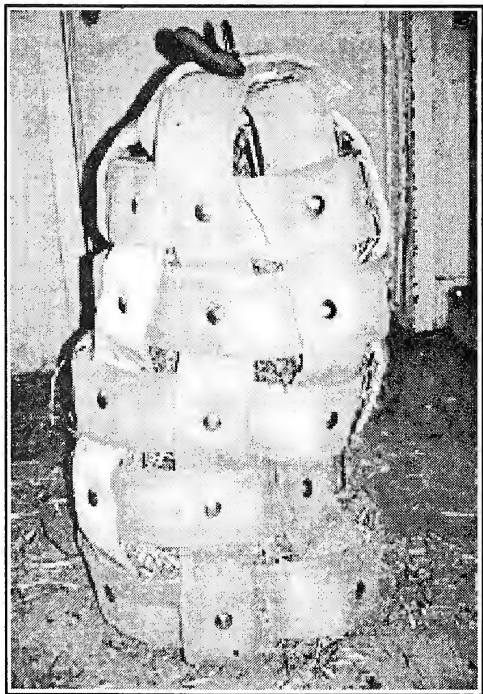


1.5 inch toy

Empty Bag w/ apple for scale



Bag filled with hay and banana treat on top



(Photos provided by the author)

Ideas appearing in this column have not necessarily been tested by the editors for safety considerations. Always think ahead and use good judgement when trying new ideas. You are invited to submit material for the Enrichment Options Column. Look in the January 2004 issue of AKF for guidelines for articles acceptable for this column's format or contact the editor at akfeditor@zk.kscoxmail.com for a copy of the guidelines. Drawings and photos of enrichment are encouraged. Send to: AKF/Enrichment, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054, USA. Eds.)

CALL FOR SUBMISSIONS

Enrichment Options readers - WE NEED YOU!! We are looking for any and all articles that discuss enrichment processes and philosophies as well as device articles. We are, however, looking for device articles to discuss not only the construction of the device but also the goals, behaviors to be encouraged, process of documentation and findings upon evaluation. We also want to know about the programs, processes and philosophies at your institution and how they work for you.

But here comes the critical piece to this equation. We need you, our readers, because you are our most important contributors. We need you to submit articles for publication because the column simply cannot exist without you. We want to share information with institutions all over the world, but we can't do it without your submissions. We want to hear about how the enrichment process works for your facility. We want to know about specific enrichment devices that are working for your animals. We want to hear your creative perspectives on all things enrichment!

Submissions may be sent in hard copy (also include a disk or CD) to: Enrichment Options, AAZK, Inc., 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054. Or you may submit material electronically to akfeditor@zk.kscoxmail.com. Please send photos, graphs or charts as separate jpg or tif files. Make sure to provide captions and photo credits. Manuscripts should be sent in MS Word format only. Please provide your contact information, including email and daytime phone number.

We hope to hear from YOU soon! Thank you in advance for your contributions!

Sincerely,

Enrichment Options Co-editors
Rachel Cantrell, Disney's Animal Kingdom
Dawn Neptune, Utah's Hogle Zoo

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REACTIONS

A Question and Answer Forum for the Zoo Professional on Crisis Management

By William K. Baker, Jr., Curator
Panthera Research, Maumelle, AR



Question

We are preparing to renovate our cat exhibit. Are there any specific points we should focus on?

Comments

The management of felids in captivity is one of the most challenging and dangerous activities in the zoological profession. For me, it's what this is all about, (yes, I like cats). The best way to look at this is to look at the situation from two different angles. One, what you are looking for in regards to the general facility layout. Two, the features you are looking for in the night house design and function.

General Facility Features

- Is the facility developed for keeper, service vehicle, and heavy equipment access? In other words, will the designer provide for long-term access to the exhibit itself? Otherwise the staff would have serious problems getting into the exhibit area for landscaping and repairs. Never design an exhibit that isn't "keeper friendly".
- Is the landscaping just an accent or has it taken over the perimeter of the area to the point of no return. Sure, you want the "regional look", but can you observe the cats on exhibit without reaching for your machete to hack a path to the New World. It's important to have the capability to observe your cats for behavioral cues during the introduction process or that might be leading indicators of health problems.
- Does the exhibit area have adequate security to prevent public interaction with the cats? Secondary guardrails should be strong enough to prevent trespass and distant from primary containment caging. "Danger rails" can still be found in some zoos that have high volume traffic or consistent public problems. Holly bushes, palmettos, and cactus are nature's version of razor wire and do a great job of keeping the public where they belong.
- Has any thought been given to night security? Night lighting should provide adequate light should the need arise. If the exhibit is expansive there should be enough security lights to enable the staff to see the entire yard at a glance, especially in an emergency.
- Exhibit designers seem to have real problems understanding drainage surrounding an exhibit. All too often the exhibit is flooded from the public areas during heavy rains. Always direct water flow away from the exhibit into storm drains and if at all possible, put the exhibit on slightly higher ground.

Night house Features

- The first item that should be noted is whether or not the entry has double containment. This "airlock system" is often times the only thing between the cat and freedom. Also, do the doors swing inward and close backwards? There is nothing more embarrassing than having the animal out of primary containment, pushing the outer doors open, and then going for a walk. Also, is the view window historically up at the top of the door? You know what I'm talking about. There's this little 5x5" window that is six feet off the ground and you are supposed to see the keeper corridor and what's waiting at the door! Consider replacing this type of window with a 6x36" vertical window, (reinforced tempered glass or Lexan®) so that you can really see what is on the other side of the door.

- Are the internal corridors laid out so that you can effectively see end to end? Designers love putting in corridors at right angles. A good night house doesn't have blind spots. If there are blind spots leading to holding areas, have they been retrofitted with mirrors so you can see the cat before he can see you?
- Do the floor, corridor, and exhibit drains really work? Masonry contractors are notorious for deciding on their own what type of slope and brush finish your floors get. Don't forget drain size. I can't count how many night houses I have seen that have 1" lines instead of 3 or 6" lines to handle water volume.
- Is the guillotine door system an afterthought? Does it stick if you look at it wrong? The coolest design I have seen to date is produced by Corners Limited™. They utilize stainless steel doors in a corrosion-free frame. The door actually rides on two coated rails that keep the fall and lift even. The cable rides inside a conduit that is connected by internal pulleys that prevent the cable from binding or jumping. Also, as a side note, don't forget to make sure that the conduit or cable system you are using is routed where keepers can visually inspect it.
- Ventilation. Is your night house a sauna? Ventilator fans can reduce ambient heat. Don't forget air-conditioning, heat, and circulating fans. In high humidity areas think about adding an in-line dehumidifier to your air conditioner. If you are uncomfortable, chances are the cats are too.
- With many of the current developments in operant conditioning and desensitization work, there are a few items you may want to include in the development process. Restraint chutes that are in-line with shift corridors leading out onto exhibit are helpful for veterinary procedures. Also, consider the possibility of including training areas adjacent to night holding to facilitate your training sessions. I find it helpful when training to have a quiet area to introduce new behaviors or refine existing ones.
- Finally, has thought been giving to crisis management? The following equipment should be handy if needed: Fire extinguishers (CO₂ and ABC), smoke detectors, carbon monoxide detectors, pepper spray canisters, back-up emergency lighting, back-up power for hot wires (battery or generator), restraint cages, shields, and even firearms. Also, is the keeper work area, kitchen, or bathroom centralized? This way if something does go wrong, there is a safe, secure, integrated area. Ideally, this area should be equipped with a telephone, back-up radio, and serious containment such as reinforced doors or a viewing window of reinforced tempered glass or heavy Lexan® construction.

Conclusion

Most of the points that were just covered can be resolved during the design phase. It's imperative that the direct animal managers be in on the final design phase. This means let the Zoo Keepers see the prints! They are the ones who have to live with the designer's vision - good, bad, or otherwise. There is no excuse for design errors. The development or renovation of a cat exhibit often takes six months to a year, construction six months to two years, and at any point the situation can be addressed. Even after the job is underway, change orders can always be made, (for a fee).

Next Month: You have often written in the past about preparedness, could you expand on that and has your viewpoint changed?

If you would like to submit a question for this column or have comments on previously published materials, please send them to AAZK, Inc., 3601 S.W. 29th St., Suite 133, Topeka, KS 66614 Attn: Reactions/AKF

(About the Author: Since 1985 Bill has been active in the fields of science, zoology, and wildlife management. His education and experience include a B.S. in wildlife management and post-graduate studies in zoology, Lab and Museum Assistant, Shoot Team Leader, ERT Member, Large Mammal Keeper, Senior Keeper, and Zoo Curator at various zoological facilities. His area of research is crisis management in zoological institutions, which draws upon practical experience and training as a Rescue Diver, Hunter Safety Instructor, NRA Firearms Instructor, and Red Cross CPR/First Aid Instructor.)

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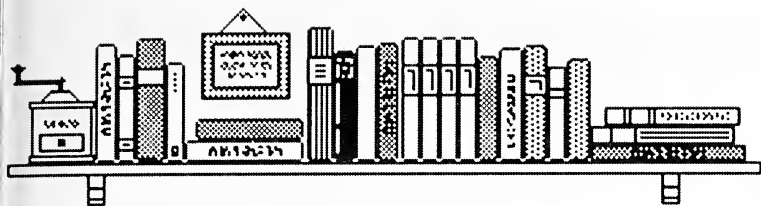
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\$25.00	\$20.00	<i><u>Animals in Translation: Using the Mysteries of Autism to Decode Animal Behavior</u></i> – Temple Grandin and Catherine Johnson – This insightful, fascinating book explores how humans and animals use their emotions to think. Her perspective is like that of no other expert in the field. Standing at the intersection of autism and animals, she offers unparalleled observations and groundbreaking ideas about both. 368 pages, hardcover
\$24.95	\$19.95	<i><u>The Grizzly Maze: Timothy Treadwell's Fatal Obsession with Alaska Bears</u></i> - Nick Jans – Jans provides a moving and complex portrait of the man known as the “Bear Whisperer,” whose controversial ideas earned him the scorn of hunters, the adoration of some animal lovers and the skepticism of naturalists. This book also offers a definitive, close-up look at bears, bear behavior and our complicated relationship with them. 272 pages hardcover
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Book Reviews

Asian Pitvipers

By A. Gumprecht, F. Tillack, N.L. Orlov, A. Captain, and S. Ryabov

GeitjeBooks Berlin, 2004

Hardcover 367 pgs.

www.geitje-books-berlin.de

*Review by Randal Berry, Reptile Keeper
Little Rock Zoological Gardens
Little Rock, AR*

Another book on snakes doesn't make exciting news owing to the fact that the hobby of herpetoculture has spawned numerous reptile books over the last decade. What is exciting is a new book called "Asian Pitvipers".

Published in Germany, the books authors, represent five herpetologists. They are considered experts in Asian pitviper taxonomy. They present a treaty of 80 + species and sub-species presently recognized.

This book features stunning photographs of known to date species and sub-species of the genus *Ovophis*, *Calloselasma*, *Deinagkistrodon*, *Gloydius*, *Hypnale*, *Protobothrops*, *Trimersurus*, *Tropidolaemus*, and two recently discovered snakes of the genus *Triceratolepidophis*, and *Zhaoermia*.

A medium sized (11" x 8") 367-page book, "Asian Pitvipers" is a long needed resource for those interested in old world pitvipers. Recent taxonomic revisions are discussed as well as locality data. Sadly, information on husbandry in captivity is lacking as well as what prey items the snakes eat in the wild.

The photographs in this book are eye candy. This publication reminds me of "Dasneue Schlangenbuch in Farbe" or "Fascination II" by Fred Kundert, (1984) and "The Worlds Most Spectacular Reptiles and Amphibians" by William Lamar and Bill Love (1997). Both of these books featured a similar layout of photographed specimens that this book presents.

The photographs in "Asian Pitvipers" are beautifully shot *in situ* and also include photographs of holotype and allotype specimens. The photos also show full body shots along with lateral and dorsal views of the head. Neonates depicted are shown along with adults to show how some snakes differ in pattern and coloration from their adult counterpart. An excellent set of photographs of selected habitats are also included giving the reader an idea of the terrain where these snakes reside.

A comprehensive checklist with type locality, type material and distribution is included along with a systematic index. The literature citations alone contain a myriad of valuable papers dealing with Asian pitvipers.

Asian Pitvipers is a must-have book for zoo libraries and the reptile keeper who are fascinated by venomous snakes.

Indoors Natural Substrates for Elephants & Medical Issues Associated with Hard Surfaces

By

Alan Roocroft

Elephant Business, Escondido, CA

Prologue

It is my hope that the information in this article will make us stop for a minute and consider the captive life of the elephant on their terms. Concrete floors that are now commonplace are obsolete and detrimental to elephant health and should be discontinued as the prime inside or outside holding area surfaces. The use of natural substrates will encourage year-round natural behaviors; it will improve sleeping, and encourage digging and dusting, elements that are now lacking, especially in zoos with inclement weather.

Having had the privilege to work with elephants for many years and knowing numerous elephant keepers, I present this information from my own experience. Thus, I hope to present an interesting, well-balanced paper on using the elephant's own biology for its betterment in captivity.

Working with elephants has been an evolutionary process for me. It was made easier over the last 15 years, on an evolutionary perspective, by the fact that I have not had elephants under my direct control; elephants that I was not directly in charge of myself, but I was still maintained by an institution that was locked into a philosophy and old style way of thinking, where elephants were concerned. This position has allowed me to get out of the proverbial historical box when building my futuristic philosophy. It has allowed me to think about elephant management in a different way, to use what I see and learn on my travels in many different countries and cultures in its broadest sense and to the betterment of the elephant in our zoos. My ultimate aim is to disseminate and implement these thoughts, especially to the upcoming young people who may be more flexible of thought, and are not yet locked into the historical perspective of old techniques and are more open to a totally "out of the box" perspective, like sand substrates.

The consideration of indoor substrates is only one of many new concepts that I will present in this and future articles that I am writing concerning better elephant management; some of these ideas are now being implemented in several zoos around the world with whom I work. Twenty-four-hour feeding strategies, "no more hay on the ground", the use of exhibit furniture that encourages and enables natural body movement like kneeling, stretching and climbing behaviors rarely seen in our zoos unless they are a part a show or demonstration to the public are among these ideas. Important aspects for consideration are improvement and utilization of the indoor elephant space and the size of the space allotted. No more square "convenient" angles in wall design and certainly, the use of boring concrete everywhere as the prime interactive surface has run its course. The use of natural interactive surfaces, I feel, is the way of the future and what we will be judged against as elephant housing in our zoos comes under criticism. Much larger and more complex outside enclosures with a 24-hour activity possibility in all weathers and climates is another consideration. We must create places in our zoo environment for elephants to get out of eyesight of one another so that they can be alone, much as they would be in the wild when feeding. This will, of course, demand innovative thinking and the use of thought processes that have never been before offered in the design of new elephant facilities.

In essence, a total rethinking of how elephants are being kept in our zoos will need to be launched. The present industry standards do not meet even basic animal needs; we allow by the existence of these standards extremely poor conditions for elephants in our zoos to continue and, when new enclosures are being created, we spend much money on out-of-date captive elephant environments using the same worn-out ideas.

Close friends and acquaintances working in the field of elephant management, and people that I have been advising in zoos around the world have encouraged me to write this article concerning the use of indoor natural substrates for elephants. It was suggested that I should write about the successes zoos are having with this idea so that the concept would become known and more widely used and accepted.

The comfort of captive elephants has never been a topic that has been comprehensively addressed or fully explored in any great depth by the elephant care community, and by the support or governing organizations such as the USDA (United States Department of Agriculture), the AZA (American Zoological Association) or the EAZA (European Association of Zoos & Aquarium). In fact, their input has been minimal, tending more to avoid the issues rather than address them. The information at workshops, schools and at other elephant keeper get-togethers is usually directed towards the control of the elephant whether it be Free Contact or Protected. Long discussions on the merits of the handling system in operation and the keepers' open defense of their preferred system seem to be more important topics of discussion. I believe that there is rarely a consideration to how the elephant is handling its environment and the confinement we provide. The elephant's natural biology is virtually never a reference or benchmark used to guide captive care. The guidelines and standards we write set the bar so low that it has nothing in common with the elephant's long-term well-being, comfort and health in our zoos.

Keeping captive elephants on natural substrates cannot be a new idea; after all, elephants spend the whole time in nature on surfaces that they can interact with and manipulate, surfaces that move and yield when touched. Thus, why haven't natural yielding substrates been adopted earlier in the history of exhibiting zoo elephants? After speaking to many people, the reasons for not considering sand substrates or deep litter on in-door exhibits, as far as I can determine, has been convenience or in a few cases medical, (cleaning concerns and the fear of colic and not being able to disinfect efficiently).

This paper is a discussion into the reasons and feasibility for keeping zoo elephants on natural surfaces, surfaces with which they can interact and which they can use in their daily lives 24 hours a day, even when keepers are not present. The idea of providing natural substrates is not meant to have any sort of scientific basis attached to it because, quite honestly, what I am suggesting is not science, but merely common sense for animal health and comfort.

Some of the common problems that face zoo elephants are associated with and the direct result of being housed on hard unyielding, cold and continuously draughty and damp surfaces. Arthritis, foot abscesses, pressure sores on cheeks and hips, knee calluses that are sensitive to the touch and swellings at the knee joints, etc, are the direct result of kneeling on concrete floors. I have seen large serum-filled swellings on elephant hips, shoulders and heads that are the direct result of exposure to hard surfaces, even to the point where the elephant will only lie down on one side or in a half-right position to rest.

As an elephant grows older it becomes more inflexible in body as well as in mind, not too different from us. Finding a comfortable sleeping position, for instance, will be a harder task for an older animal when the only surface is a hard flat concrete pad or some other version of hard substance. Although convenience and sometimes medical are the reasons given, I can say for myself that, if someone had come to me with such an idea during my earlier years in elephant management, I would have laughed at the idea in a similar way as I laughed at not chaining elephants at night. We have done it this way for years so why change it? If I couldn't wash the floor, then I was not doing my job correctly. In many ways this is very much like the stereotypical behavior, one that is not uncommon in the elephants for which we care. Today, however, I am convinced that a change in substrates, particularly in cold northern climates or in zoos that use indoor housing at night as a prime holding area even in warm locations, is one of the key elements of keeping elephant's healthy long-term, in a zoo environment.

The turning point in my case to consider the value of natural substrates was the first irreparable foot abscess I had seen, and elephants that wouldn't lie down to sleep at night - which in our zoos are many. I was asked to treat an abscess and then I realized that I could not offer ongoing successful

treatment or repair the foot if the elephant continued to be housed in such sterile unyielding conditions. I was witnessing that abscesses were only the symptoms of a problem, not the actual problem. The elephant's environment and the elephant's abnormal behavior caused by the environment was the *actual* problem. I now believe that abscesses are avoidable. It goes without saying that any foot abscess is a problem in itself but, if left without treatment or a change in environment is not considered, will eventually kill an elephant.

Poor facility and exhibit design, plus the stressful and biological depletion on the elephant from daily routines, all help to develop behavioral problems in captive elephants. Lower stress by lowering the waiting and anticipatory behaviors in your elephants. Examine your daily routines, stop the rocking, provide them with surfaces they can utilize and with which they can interact. Finally, enhance their natural biology, encourage natural tendencies in feeding and sleeping patterns, create good habits in your elephants; only then can you start to repair the foot abscess and divert psychotic behavior.

Hard surfaces, combined with repetitious rocking and swaying behaviors, as well as anticipatory waiting behaviors are the kiss of death for captive elephants. The elephant does not do well when it is left with "down-time", time just waiting for the next thing to happen. Thus, securing your elephants (whether with a gate or chains) in a conveniently cleanable stall at night, one devoid of any stimulation, is the worst kind of "down-time"; chaining only increases the effects of the confinement.

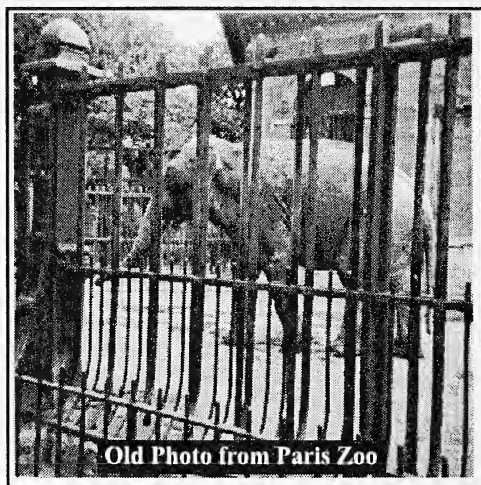
Just so that everyone who reads this article is clear and understands exactly what we are doing and condoning: Elephants spend upwards of 16 out of 24 hours on hard, unyielding, none interactive surfaces, and we can now point to this as playing part of their medical and physical deterioration.

As an interim solution now, many institutions install rubber mats and even go to the great expense of laying down poured materials onto the surfaces in elephant night quarters. These interim solutions in zoos are a result of seeing foot problems or other medical issues in their elephants, or hearing from other institutions that have had medical issues in their elephants. Some zoos are pouring rubber pads because they hear it is the right thing to do, but don't have any reasonable basis other than someone else did it.

To me personally, rubber flooring in prime housing areas is only an uneducated gesture and recognition that the elephant needs a different surface on which to stand, but at the same time there is also a need to hang onto the convenience of cleanable flooring; it has nothing to do with elephant comfort. Rubber flooring does not offer the digging, sleeping position variations, or topography options for older and medically impaired elephants a natural surface would. Some zoos, in a misguided futuristic gesture, have poured the rubber floors onto slopes with undulating areas in the anticipation of needed topography and lying-down options for the elephants. This idea provides only minimum improvement

options at best, and the special needs of each elephant cannot be fully met by this, particularly if the elephants do not use the slopes you provide. As examples of needy elephants I might cite large bulls with tusks, and older females with wrist and knee joint issues or pressure sores on head and hips. An elephant's captive environment must represent a haven, a place where each individual with their idiosyncrasies can relax, and a place where their needs are met and not a place in which they merely survive.

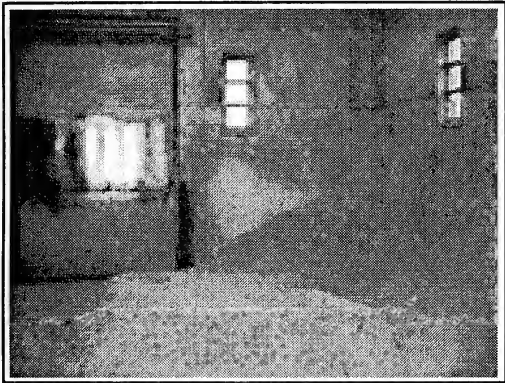
Many different floor types have been tried in the past with minimal success and results. Cobble stones were one of the first. Asphalt, wooden blocks or wooden pallets, tiling, concrete and rubber are all surfaces that have been used to house elephants at one time or



another in the history of zoos. They all have one aspect in common: they are all surfaces that are reasonably convenient to clean and in general terms are relatively cost-effective in upkeep.

We have moved away from elephant facilities like the one in the photo on the previous page, with the new architectural statements that are being presented. We are building captive elephant areas that look like the wild but do not act like the wild. Plastic plants, pour-on rock, bird music, concrete floors all create the idea of what an elephant environment should incorporate. But my question is: Do our new facilities represent anything better for the elephant? Can the elephant enact natural tendencies or do anything it would normally do as an organism? Are we building environments for the elephant's or for ourselves?

In contrast, I have been working with five institutions that, on my recommendation, have installed or are considering installing natural substrates as an alternative to what is being offered at present in the Zoological World.

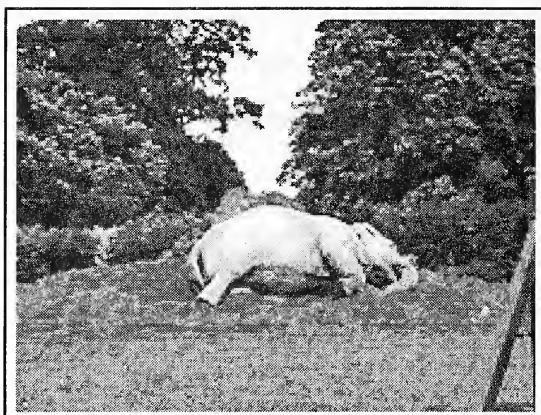


Beekse Bergen Safari Park in The Netherlands (at left) finished (in 2004) an inside stall for the new African bull Calimerio that arrived from Basel, Switzerland. Calimerio is using the sand area for sleeping while he defecates on the adjacent hard floor where his daily wash routine is performed. This facility was designed with an in-wall heating system.

Amersfoort Zoo, also in The Netherlands, has also provided a natural substrate in one-half of the bull holding house so that he can lie on contoured flooring, enabling him to make a recess for his tusks and large head. The flooring will also be heat-efficient because of its depth. Concrete floors and pipes have an awful way of holding the cold and as an elephant gets older and less agile, they stop lying down and then prefer to lean against the wall instead.

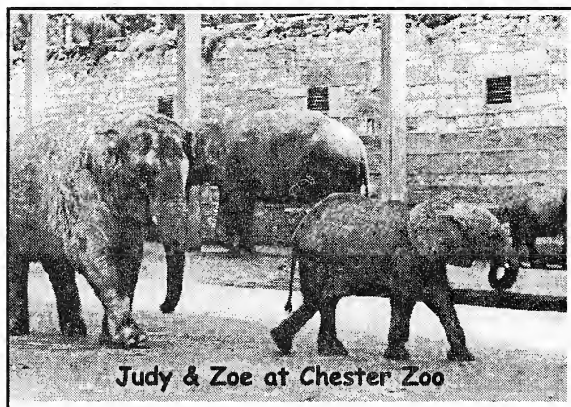


Amersfoort Zoo in The Netherlands co-hosted with Beekse Bergen Safari Park an Elephant Foot Care Workshop in October 2004. A major focus of the workshop was a consideration to natural substrates. The attendees were extremely interested in the amount of effort zoo staff provided their bull Sammy with a new interactive environment everyday.



The Dublin Zoo in Ireland, under the direction of their visionary Director Leo Oosterwegel, is presently considering installing a sand substrate into their new elephant exhibit design. The Dublin Zoo has embraced the idea for the whole inside area of their new facility for all elephants to be a natural substrate, cows included. One of the most convincing factors was that during the summer months in the outside yard Judy, one of Dublin Zoo's two cows, can lie down to sleep on a very large sand mound that the zoo has provided for just that use. After

the new facility has been constructed, Judy will be able to lie down during the winter also in her new improved inside environment.



The Chester Zoo in England is to date remodeling their presently very large elephant house and making it even larger and more elephant friendly. The inside will be divided into two areas; a rubber-covered floor for the daily wash routine and the second, in public view, will be sand. The public will be able to observe elephants during the winter months enacting natural behaviors such as digging holes, throwing dirt and, if they are really lucky, they will see an elephant making its bed, pushing their massive heads into the soft substrate

making inclines and topography to find a comfortable resting position. Now this will be truly massive progress and another good example of progressive husbandry for the zoological community worldwide that Chester will be providing. In the 1960's, Mr. George Saul Mottershead, the founder and Director of the Chester Zoo in England, had the wisdom to try a totally new concept that he called "A Zoo without Bars". He was interested in exhibiting animals in open, free viewing areas, free of bars and free from viewing restrictions with many animals at his zoo. Elephants were one of Motty's, as he was affectionately called favorites, and that led him to the open concept for exhibiting elephants. I also believe that philosophically he never agreed with the fact that chaining the elephants was absolutely necessary. Time has proven him right. This decision, of course, put an additional pressure on his then very hands-on staff. The result was the first of its kind, an inside area that allowed a free run for elephants that put distance between them.

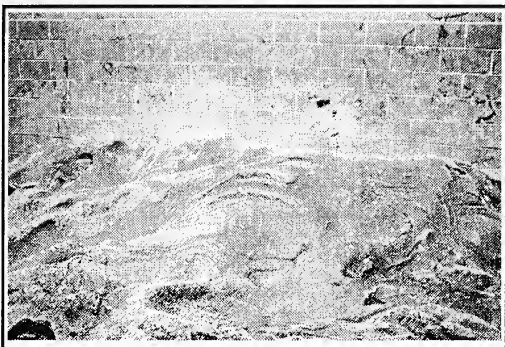


The Roger Williams Park Zoo in Providence, Rhode Island incorporated a sand area for their three African females some time ago. They are now redesigning the elephant house and have decided to enlarge the sand area



and encompass more of the facility which is off public view. The reason for the enlargement of the sand area, and a very positive shift in elephant husbandry and I must say, a considerable monetary investment is quite simple: it benefits the elephants. The zoo staff has carefully observed and evaluated the use of the sand by the elephants and weighed it against how elephants were kept in the past at RWPZOO and also, how they are being kept in other zoos.

The photo to the right shows the inside sand area at RWPZOO where an elephant has laid down to rest at night, using the topography of the ground to support tusks, head, neck and legs as they sleep. Most elephants try to attain a foetal position when sleeping; and the slope of the mound helps older elephants to manoeuvre when getting up.



Disney's Animal Kingdom in Florida has just stated to experiment with sand flooring in one of the stalls for their African elephants. The elephant manager who I was together with on a job at another zoo also saw the wisdom in what I was suggesting and implemented it at his facility. The idea is on the move.

Medical issues and ongoing physical problems that are caused and aggravated by the conventional employment of hard, unyielding and non-interactive surfaces

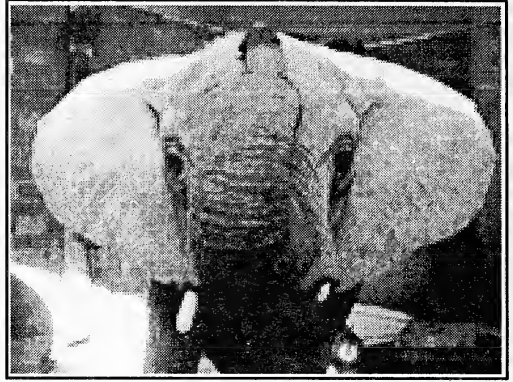


Medical problems due to living on hard unyielding surfaces, to which elephants have been exposed since being kept in captivity in the west, continues to take an incredible toll on many zoo elephants. Where possible, elephants enjoy rolling, resting and digging in sand piles twenty fours a day, if they are provided. Generally, however, sand piles are provided in zoos on an inconsistent basis and elephants only have access to sand outside but even then many elephant yards are flat and boring with no stimulus value. Sand or natural substrates on indoor areas have not been widely considered at this point. But believe me it's coming.

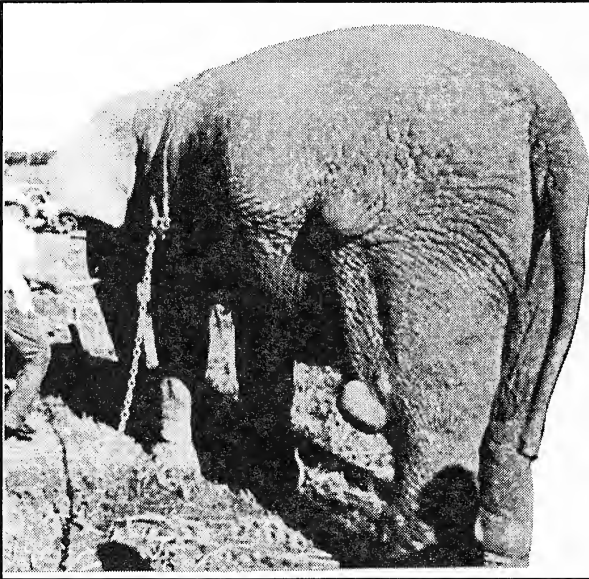
Tusk wear on concrete flooring has been a big problem for elephants in zoos for many years. Some zoos have even resorted to capping or metal banding the tusks so that tusk contact with the concrete is avoided. This has had mixed success. I have always wondered how mature bulls with large tusks can lie down on a flat level surface to sleep, and as also always wondered when exactly does the time comes that they stop lying down; how does that very moment occur when the animal says to itself: the pain and discomfort of going down and then getting back up again is not worth the benefit of being down. When growing up I always heard that elephants could sleep standing up. That was fascinating to me then like a lot of other elephant mystic. Today I am not so sure how acceptable such a statement has been and what effect it might have had on the health of thousands of zoo and circus elephants that had to sleep standing up because their quarters were inadequate. Elephants

need to rest, they need to take their enormous weight off their large feet, and they cannot do it easily on a flat or hard surface.

Pressure is the worst thing for elephant's feet, particular for older and out-of-condition, overweight and lethargic animals. The lack of muscle tone and abnormal bone development in the legs can only mean that their feet take more abnormal pressure than they would normally take in nature. The skeleton is meant to carry the weight of the body with the help



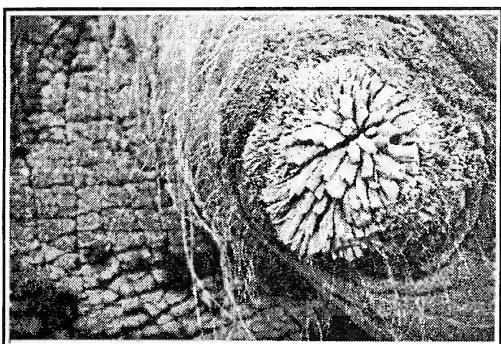
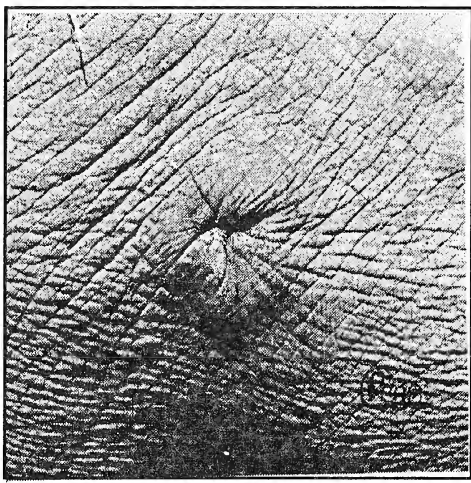
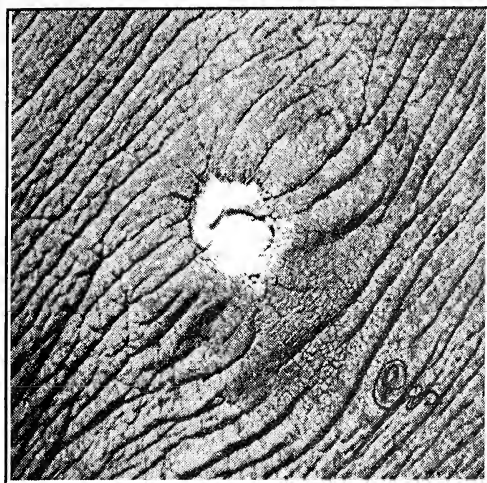
of the muscles but, if the muscles are limp and sagging, then the weight is only going one way - down. Weight distribution in elephants is a 60%-40% split most of the weight being carried over the front feet. If these percentages are disturbed or the elephant is compensating because of a physical abnormality, the percentages will shift creating damaging pressure where other foot and legs joints start carrying the extra weight.



Pressure sores on the hips and temporal areas, large uncomfortable sinus and sensitive spots on the body from lying on concrete floors are common in our captive elephants. This old circus elephant has two very large sinus growths and a small bump above the knee on her left side; she had none on the other side. These sinuses are usually filled with a clear serum and, in my experience, they are benign swellings that cause extreme discomfort to the elephant when touched and will obstruct the elephant from lying on that side, but they have no other medical consequences. If the decision is made to operate, they take a very

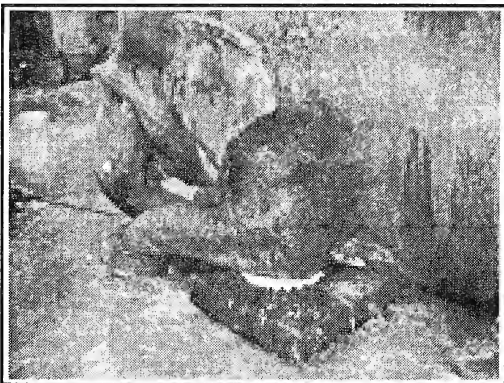
long time to heal, and this then leaves an uncomfortable scar making lying down even harder. The sinus itself is better left alone in my opinion if no weeping or drainage is present.

The following photos are of hip sinus that was operated upon whilst the animal was under my care; it took five years to heal. The original hole was 6" square and 4" deep on the initial day of surgery and it was extremely difficult to keep clean. Throughout the healing process, lying down on the left side was out of the question for this animal, at least at first but, as the inside face of the sinus hardened and dried, the elephant would lie down on that side also. This particular sinus developed because of an uncomfortable stall arrangement where she could only lie against the wall of the stall in a half upright position, thus stretching and applying, I believe, abnormal pressure on the left hip and thus causing a sinus at the hip joint to occur.



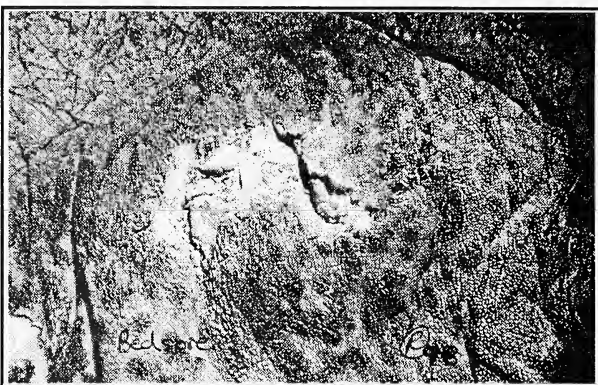
Elbows and the temporal area of the head are two other areas that suffer tremendously from continual contact, either during mandatory wash or performance routines, or at night when the elephant is trying to find a position to rest on the hard surface of its stall.

When an elephant is in the first stages of joint discomfort and it appears difficult for the animal to attain a stretch position during a routine care, one should alter the daily routine until the underlying nature of the problem has been detected and possibly alleviated. All too often I hear that the animal is "playing with you, she knows how to lie down". This, of course, could be the wrong answer. Check her kneepads, front and rear; if they are tender to touch, she probably has a pressure sore developing under the hard callous surface of the knee. This type of condition needs time to heal, so all lying down routines should be discontinued until the extent of the damage is known. Every consideration should be given to the animal's comfort, thus observation is the key. In the photo at right a soft rubber pad was used as an interim solution to soothe a tender knee joint and help the elephant gain confidence in lying down again.



Re-evaluate your routines. The knee joint of an elephant is not meant to be a weight-bearing joint thus the stretch positions where all four knees are on the ground at one time for the elephant to be washed or brushed off is an abnormal position, the half right position is even worst because all of the front body weight is on one knee. Pressure and tissue damage in the knee joints occurs rapidly.

Who has not seen temporal or hip pressure sores on elephants? They are so common in our zoos that, when speaking to young keepers about them, many think it is a normal part of the elephant's physiology, something we should expect with captive elephants. How sad to think that a medical issue caused by inconsistencies in our husbandry practices has reached a level of normalcy. What other inconsistencies and detrimental practices to our elephants in our husbandry have reached a level of normalcy?



An elephant's foot is not designed for continuous contact with hard surfaces. Their feet need an undulating topography and sideward motion that strengthens tendons and ligaments so that the feet grow strong and straight. They need dry sand, sometimes wet sand through which to run their feet on a 24-hour basis. I just recently visited a zoo in the west that had built a brand new elephant complex, the outside yards were so flat it was as if someone had purposely use a laser level on them to get them so flat.

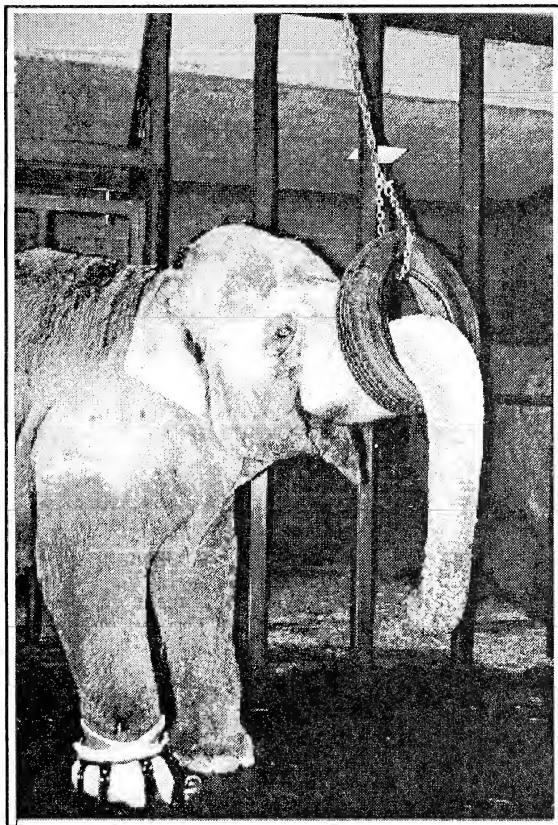
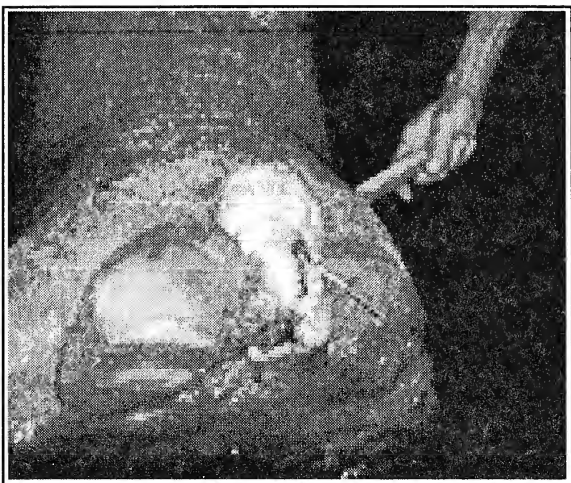
Elephants are not a vehicle or an inanimate object; you cannot just put them away into the garage at night on hold, waiting for the next convenient time to take them out or put them through a control-orientated activity. The elephant has a very distinct and unique biology that needs to be enacted over a 24-hour period. An eight-hour keeper shift means absolutely nothing to an elephant, and the downtime, the 16 hours standing around waiting for the keepers to return is devastating to an elephant's physical and mental well-being.

Pressure to the feet and tissue damage is relatively quick to start and it advances rapidly if not attended to by experts. Below are two examples of abscesses in elephants' feet that, I believe, have their root cause in continual pressure, standing in a confined space and on hard surfaces.



The first photo to the left is an African elephant that was allowed to stand and stereotype in her reasonably large enclosure at a gate for years, plus spending 16 hours in her stall at night on a concrete floor doing the same thing. Eventually, the rocking motion caused irreparable tissue damage in both of her number two nails on her front feet.

The second picture to the right is an extreme case of an abscess in an Asian elephant's left front foot. This animal had abscesses in the other foot also. The environment that this animal lived in for years was totally unsuitable for her biology and consequently, she died from medical issues related (I assume) to her foot conditions.



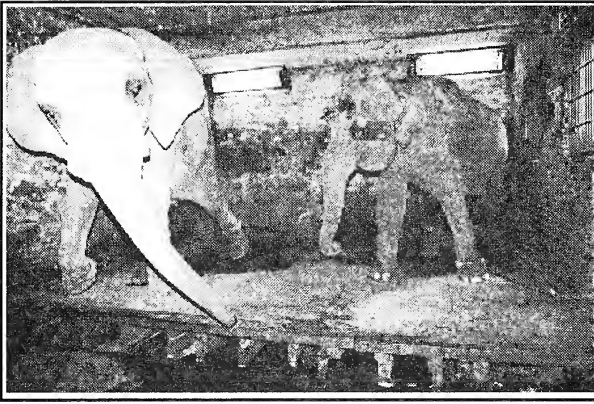
Once an elephant becomes infirm, particularly as far as the feet and joints are concerned, it will decline and deteriorate rapidly. What further impacts the elephant's health and compromises its condition is the fact that it cannot rest adequately. The elephant in this photo at left, in the latter days of its life was provided a tire so that it might at least redistribute some of its body weight in order that its front feet and leg joints could rest.

Please remember, the elephant cannot get away from the environment that we have provided for it.

With access to natural substrates, throughout its whole life, the elephant learns that it can manipulate the sand and use it to its advantage. Leg joints and tendons, feet muscles and ligaments become strong and flexible. Anticipatory and repetitive behaviors that encourage stereotypical motion are greatly reduced if feeding strategies and other behavioral furniture that will enact and encourage natural behaviors are installed along with

sand flooring. Digging, kneeling and lying down on a regular basis, even at night, 24- hours a day, 365 days a year, encourages behaviors in the elephant and instills good habits that the elephant benefits from over the long term of its life in the zoo. Even if a healthy elephant learns that it cannot find a comfortable position in a concrete stall, it will eventually stop lying down because now the elephant knows that it cannot find a comfortable position to rest; it becomes a bodily habit of the elephant and, in essence, the elephant gives up on the process and reverts to the next best possibility, leaning against a wall with its head or sides, causing other problems.

Old-style Elephant Keeping and Housing



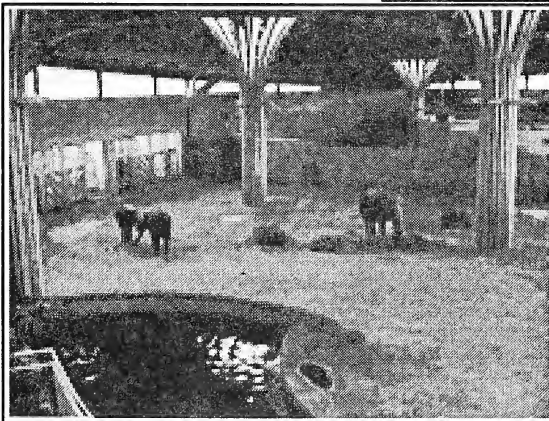
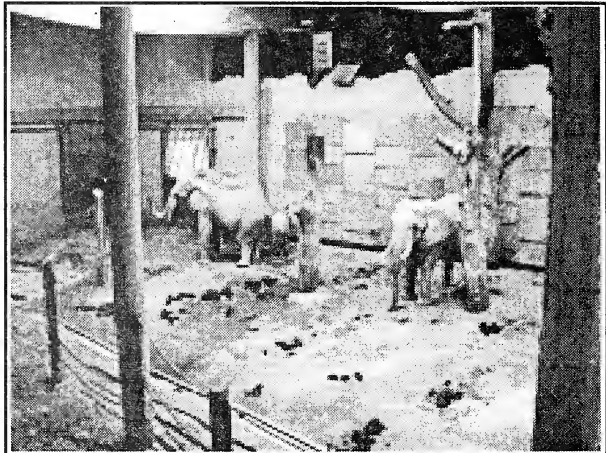
Finding elephants in unfriendly, unhealthy, biology-deprogramming environments is not hard, even in our zoos today worldwide. Old elephant facility design, encouraged unnatural physically-depleting behaviors. Long hour of waiting at doors, chained in one place and constantly pacing until the keepers arrived was and is the norm. We are not so far from that photo at left in our modern zoos even today.

Even though chaining was abolished in many institutions many years ago, the elephant moved its stereotypical habits to another area of the barn, just to stand and rock in a corner or at a door or safe area of the barn. Removing the chains was an easy decision for zoo administrators because it is unnatural for the elephant to be restrained for 16 at night. But what else should we see as demeaning to our captive elephants? I still see huge steps that must be taken in order to bring our zoo elephant management to only a basic level of welfare for the elephant.

New Elephant Facilities with New Ideas

There are, unfortunately, not many zoos at the moment where innovated elephant biological supporting ideas are being implemented.

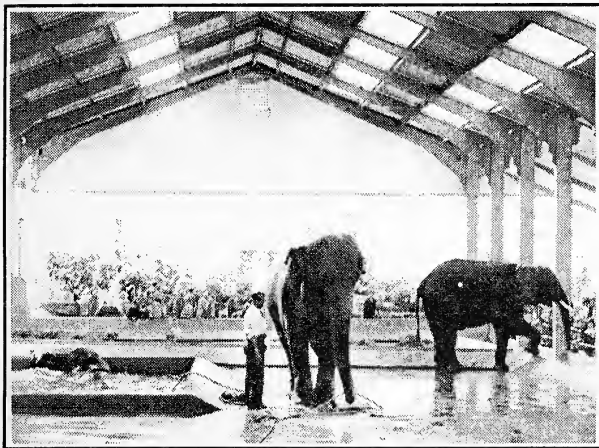
The present elephant facilities are not elephant-friendly by definition, and it is my opinion that the present designs have a tendency of causing many long-term problems for our elephants, both physically and mentally/socially. Old ideas are dusted off and reinstated; some how it seems to be difficult for the design process to get out of the historical



box in which the zoo community all too often finds itself. Effectively, when a new house is opened to the public for the first time it will be 50 years out-of-date already on the day it is opened. Elephants are still standing on hard unyielding surfaces for long hours in the winter and they eat hay off the ground and stare at concrete walls for long portions of the day, not very different from the way it was years ago. They are standing around for hours, looking at the walls until the keepers arrive, and they all do what they can, wait & cope that is the norm for many of our zoo elephants.

I have to say at this point, and in defense of our zoos knowing the people like I know them, that this is in no way a malicious act or done with malicious intent. The issue of change is so large and overwhelming when dealing with captive elephant management that it is not easy to activate a forward motion that will benefit the elephants long-term. I know and work with many people in our zoos worldwide who would change the situation for elephants if it were within their power. And there are some people who I work for who have, to date, radically changed the lot for elephants in their zoos in a positive way.

The Chester Zoo built a revolutionary open-space elephant building in the 1960's for their then two African bulls and one Asian female. This visionary idea never caught on on a grand scale because



nobody in the elephant community then thought that elephants really needed space, both physical and visual. The zoo community back then, myself included, saw them as a beast of burden whose lack of freedom could be easily justified because thousands in Asia were under the same circumstances.

Another idea that didn't catch on - in the early 80's I was part of a team of people heading up an idea for an elephant reserve and university concept at the San Diego Wild Animal Park in California. I

originated the idea because I was beginning to see tremendously inequity, even back then, in the way elephants were being kept, the way people were being trained, and finally in the way we were meeting our mission - a sustainable elephant populations in captivity. So the idea of creating a large open scope place for free-roaming elephants where young people could come and learn about elephants and their unique management requirements was an attractive proposition, I thought. The idea was simple - bring all elephants that zoos didn't want or couldn't manage anymore and put them in an extremely large facility that could provide the care they need long-term. Give them hilly space they could roam, areas to climb, feeding stations for motivation and productive movement, population numbers that elephants desperately needs to build relationships and bonds with one another. Basically, provide an environment that would reinstate the elephant's natural biology. No elephants were to be brought from the wild as support animals. Each zoo sending an elephant would pay a yearly fee for the upkeep of its elephants. The ultimate goal of the concept was to centralize elephant knowledge and bring in considered experts of the time. I still have the list, from all sectors of elephant management from *in-situ* and *ex-situ* areas. We would start to set a standard of care for elephants that would generate information that would benefit the elephant. We would have called the centre "The Elephant University & Fan of Conservation". The centre and spawning organizations would have been designed over the next hundred years to create a sustainable population of elephants in the USA and Europe from the then biologically-dysfunctional elephants already in zoos. One not-so-feasible aspect of the centre would have been the attempt to reintroduce elephants into a selected location; managed and funded by our zoos both AZA & EAZA in Asia that would have been our contribution to the future of elephant's worldwide. Possibly, if we would have implemented the idea in the 80's, our elephant management would have been a huge step ahead right now, and we would have accumulated much more information on the importance of social structures and herd dynamics; and perhaps been able to avoid all the criticism that the AZA is under for the inadequate welfare of the elephant. That was over 20years ago and, although we started the process of concept building and facility design, the idea fell on deaf ears when we started to talk about money and the all people involved did not have the essence needed to see such a visionary project to fruition.

In conclusion then, for far too many years we have centered on the convenience of elephant keeping by maintaining them like a bus in the depot when not in use. Cleaning the barn took precedent over many of the important elephant's biological needs. Moreover, for reasons of the always-present looming cost of elephant programs, we have never focused on the elephant's basic comfort as an organism, often putting available funds more into interpretation and visuals for the public. Elephants are locked up in small stalls for long hours - often at extremely low temperatures - not even being able to relieve an itch on their backs on the round metals bars of the stall.

Why don't we let them throw sand over their backs in the early hours of the morning or obtain a trunk-full of food hanging high and barely in reach. Elephants have wonderful natural abilities that we could show to our zoo guests and which create an enriching zoo experience if they are planned correctly.

Use the elephant's biology as your reference when considering their captive care and work from the elephant outward. If there is anything on your elephant program or institutional priority list that has a higher priority than elephant welfare, the elephants are ultimately not the main focus and we as a community will face the continuous and ongoing challenge of how to justify our poor successes at exhibiting elephants in our zoos.

Acknowledgements

My sincere appreciation and thanks go to the following people who have influenced, encouraged and helped me with my ideas to introduce innovative husbandry to captive elephants, some have already implemented or are seriously considering the implementation of my ideas at their institutions. My hat is off to you all.

Mario Hoedemaker, Amserfoort Zoo, The Netherlands.

Bas Aalders, Amserfoort Zoo, The Netherlands.

Elephant Keepers, Amserfoort Zoo, The Netherlands.

Wim Verberkmoes, Beekse Bergen Safari, The Netherlands.

Elephant Keepers, Beekse Bergen Safari Park, The Netherlands.

Mark Pilgrim, Chester Zoo, England.

Mick Jones Chester Zoo, England.

Elephant Keepers Chester Zoo, England.

Jack Mulvena, Roger Williams Park Zoo, Rhode Island, USA.

Pat Sharkey, Roger Williams Park Zoo, Rhode Island, USA.

Jennifer Warmbold, Roger Williams Park Zoo, Rhode Island, USA.

Elephant keepers Roger Williams Park Zoo, Rhode Island, USA.

David Tidwell Architects to Roger Williams Park Zoo, Rhode Island, USA.

Geoff Hall, Phoenix Zoo, Arizona, USA.

Dr. Kevin Wright, Phoenix Zoo, Arizona, USA.

Heather Wright, Phoenix Zoo, Arizona, USA.

Elephant keepers, Phoenix Zoo, Arizona, USA.

Leo Oosterweghal, Dublin Zoo, Ireland.

Photography credits: Mike Hudon, Doris Sorby, and Alan Roocroft

Legislative/Conservation Update

Compiled by Georgann Johnston
Legislative Advisor
Sacramento, CA



Three Parrot Species Repatriated to Mexico

A collaboration between the U.S. Fish and Wildlife Service, SEMARNAT (Environmental Ministry of Mexico) and PROFEPA (Mexican Attorney General for the Protection of the Environment) has resulted in the repatriation of 298 parrots to their native habitat in Mexico. The birds include 66 lilac-crowned amazon (*Amazona finschi*), 22 red-crowned amazons (*Amazona viridigenalis*), and 210 green conures (*Pyrrhura molinae*). All of the birds were confiscated by USFWS authorities from individuals attempting to smuggle the birds into the U.S. from Mexico. Almost all of the conures have been released into the wild in the State of San Luis Potosi, Mexico. Some of the amazon parrots have been released at undisclosed locations while others are being held in quarantine facilities in Mexico awaiting transfer to suitable habitat. Source: *TRAFFIC Report* vol. 4, no. 1 August 2005

Three North African Antelope Species Listed as Endangered

The USFWS has listed three North African antelope species, the scimitar-horned oryx (*Oryx dammah*), addax (*Addax nasomaculatus*), and dama gazelle (*Gazella dama*), as endangered under the U.S. Endangered Species Act (ESA). Simultaneously, the agency issued a final rule to encourage this country's captive-breeding programs for these species by excluding U.S. captive-bred live specimens, including gametes and embryos, and sport-hunted trophies from some ESA prohibitions, provided certain criteria are met.

"Habitat loss, unregulated killing, and political instability have led to the near disappearance of all three antelope species in the wild in their native countries," said Service Deputy Director Marshall Jones. "On the other hand, existing U.S. captive-breeding programs have been so successful that the Service decided to ease certain ESA prohibitions to ensure captive-bred antelopes will be available to use in efforts to conserve their wild kin."

Captive breeding in the United States has enhanced the propagation and survival of the scimitar-horned oryx, addax, and dama gazelle worldwide by rescuing these species from near extinction and providing the founder stock necessary for reintroduction. Many U.S. captive-breeding facilities, such as zoos and ranches, are working with countries such as Tunisia and Morocco to breed and reintroduce the antelopes in the arid North African habitat they historically occupied. As additional opportunities arise for reintroduction, captive-breeding programs will provide genetically diverse and otherwise suitable animals. Ranches and large captive wildlife parks for non-native populations offer large areas of land that simulate the species' native habitat and can accommodate a larger number of animals than can most urban zoos; they also provide opportunities for studying, breeding, and preparing antelopes for eventual reintroduction into the wild in North Africa.

"An international partnership of zoos, private landowners, researchers, and range country officials agree that, without captive breeding, it would be difficult, or in some cases impossible, to restore many animals to their native habitats, particularly for species that may have become extinct in the wild," Jones said. Source: *USFWS Press Release* 1 September 2005

National Park Service Employees Shed Light on Rewrite of NPS Rules

The Coalition of National Park Service Retirees, along with some current NPS employees, has launched a broad attack against what they call "an ongoing and secret Interior Department attempt to rewrite and override 90 years of laws, rules and court rulings governing the 388 sites in the U.S. National Park System."

A few days prior to the August 2005 White House conference on the environment in St. Louis, MO, the CNPSR released a redlined version of the Interior Department's radical rewrite of "the rulebook"

for the National Park Service. Spearheaded by a political appointee who was the former head of the Cody, WY, Chamber of Commerce, the hundreds of proposed changes to NPS procedures have been drawn up with no input by Congress, the public, or the superintendents of national parks. The draft document is available at <http://www.npsretirees.org>. Although the Interior Department document is a work in progress that will continue to change, it is considered by NPS insiders, Coalition members and other concerned parties to be an accurate and extremely revealing expression of the true intentions of the political appointees now running the U.S. Department of Interior.

Under the proposed rules, the use of snowmobiles would be radically expanded from currently limited levels at Yellowstone and other national parks. In dozens of national parks and seashore areas, the use of jet skis, ORVs, dirt bikes and other mechanized vehicles would be permitted on a virtually unrestricted basis. At Great Smoky Mountain National Park and dozens of other parks, the rules would permit huge increases in the number of noisy overflights that destroy the natural peace and quiet. Rather than working with park visitors to minimize the problems posed by improper food storage and other temptations, rangers would be forced to kill bears at Yellowstone if they damaged private property.

Although experts in CNPSR and other concerned groups are still weighing the likely impacts of the hundreds of proposed changes in the Interior Department draft, it already is clear that all or most of the 388 sites in America's National Park System would suffer major and possibly irreversible damage under the rule changes. CNPSR Executive Council Chairman Bill Wade, said: "The Coalition of National Park Service Retirees opposes this astonishing attempt to hijack the management of the 388 areas of our nation's park system and convert them into vastly diminished areas where almost anything goes. Until recently, both political parties have viewed the management of our parks as "off limits area" where partisan politics are set aside and decisions are made based on what is truly in the public's interest. These draft policies shatter that precedent in favor of smash-and-grab politics that would weaken the preservation and protection of the areas that previous generations have added to the system. We should not trash the proud national park legacy that has been handed down to us by our parents and grandparents."

This press release is the second major "leak" by CNPSR in two years of an internal document detailing plans to undercut America's national parks. In March 2004, CNPSR exposed internal NPS memos directing park superintendents to slash summer 2004 park services and then to mislead the news media and public about the cuts, which were to be referred (and only if necessary) as "service level adjustments." The ensuing public uproar led to a widely publicized March 24, 2004 hearing by the House Appropriations Subcommittee of the U.S. House of Representatives. *Source: Sacramento Bee 26 August 2005, CNPSR Press Release 26 August 2005*

USFWS and Clothing Company Patagonia Work Together to Halt Invasive Species

Patagonia, the California outdoor clothing company, has teamed up with the USFWS and the National Aquatic Nuisance Species Task Force to help raise public awareness about the threat of aquatic invasive species through the "Stop Aquatic Hitchhikers!" program. As the 173rd member of the growing campaign, Patagonia brings a global reputation as an environmental leader in the outdoor and recreational fishing industries. Patagonia's support for the campaign will enable it to educate millions of anglers, outdoor and paddle sport enthusiasts about invasive species' threats across the country. Patagonia is the latest in a list of partners that includes Federal and State agencies, universities, other businesses and national, regional and local conservation organizations. As the primary funding agency for the campaign, the Fish and Wildlife Service works to promote "Stop Aquatic Hitchhikers!" and tap into the communication networks of its partner organizations.

The majority of foreign plant and animal species that have found their way to North America are benign, but a small percentage are responsible for major environmental and costly infrastructure damage. Zebra mussels clog industrial and marine water intake equipment, Chinese mitten crabs damage commercial fishing nets and the Round goby continues to consume the eggs of bass, walleye and perch in the Great Lakes. Some credit invasives with more than \$120 million in damage each year in the United States.

"'Stop Aquatic Hitchhikers!'" is the type of program that Patagonia likes to support because it's an

action-oriented campaign that addresses a major environmental issue 'invasive species' and makes the issue relevant to people who can do something about it," said Bill Klyn, Patagonia's fishing marketing manager. Klyn said he considers the campaign one of the best approaches to combat aquatic invasive species, which include threats from species like the New Zealand Mud Snail and Whirling Disease. "It makes good sense to make our customers aware of what they can do to help address this issue," said Klyn. "We plan to incorporate the campaign materials into the marketing efforts of our fishing and paddling product line." More information about Stop Aquatic Hitchhikers! is available at www.protectyourwaters.net. <http://www.protectyourwaters.net>. Source: USFWS Press Release 8 September 2005

New Lemurs Discovered in Madagascar

Two new species of lemurs have been discovered in Madagascar, raising the number of known members of those species of endangered primates to 49.

A giant mouse lemur called *Mirza zaza* is the first species. "Zaza" is the Malagasy word for "child" or "children." The name reflects the animal's small size and honors the island's future generations. This nocturnal lemur is about the size of a grey squirrel with a long bushy tail. Until now, it was thought that the island was home to only one type of giant mouse lemur.

The newly discovered *Microcebus lehilahytsara* lives in Andasibe, a protected rainforest area in eastern Madagascar. A nocturnal tree dweller, it is slightly bigger than a large mouse, with short, rounded ears, and a white stripe on its nose. It has short, dense maroon-colored fur with orange and white highlights. The term "lehilahytsara" means "good man" in Malagasy. It honors Steve Goodman, a scientist with the Field Museum in Chicago and World Wildlife Fund who conducts field research in remote parts of Madagascar.

The findings were presented in August at the Congress of the European Federation for Primatology and appear in the current issue of the journal Primate Report. Source: Excerpted from a Canadian Broadcast Corporation release of 9 August 2005.

Key to Elephant Conservation is 'in the sauce'

What do hot sauce aficionados and African elephants have in common? They both feel the burn of chilli peppers, the key ingredient for resolving human-elephant conflicts in Africa while raising money for farmers and conservation.

Supported by the Wildlife Conservation Society (WCS) and other groups, the Elephant Pepper Development Trust (EPDT) has not only promoted the use of chilli peppers as a means of keeping elephants, buffalo, and other species away from important sources of human food, but has also introduced a viable cash crop to the economy of African nations.

"Chilli peppers are unpalatable to crop-raiding mammals, so they give farmers an economically feasible means of minimizing damage to their investments," said Loki Osborn, project director for the EPDT. "They can be grown as buffer crops to prevent crop-raiding and then be harvested and sold on the world market through the Trust."

Osborn originated the idea of Elephant Pepper in 1997, when he found that chilli peppers could be used as a means of stopping elephants from destroying crops in the Zambezi Valley, which straddles the borders of Zimbabwe and Zambia. While electric fences and other deterrents are prohibitively expensive, chillies provide farmers with a cost-effective means of warding off the elephants without inflicting them with permanent damage. Specifically, farmers use chilli peppers to deter potential crop raiders in two ways: as a protective buffer crop to surround core crops of maize, sorghum and millet; and as an ingredient in a spray to drive away animals.

In addition, chillies are currently being used in the production of bottled hot sauces, jams and relishes. Proceeds from these products are donated to the Trust to support the development of chilli growing projects.

"This is a highly creative and effective way to solve a growing problem across the African landscape,"

said Dr. James Deutsch, director of WCS' Africa Program. "With the growth of human populations in the Zambezi Valley and beyond, people and wildlife come into more frequent contact than before. Elephant Pepper products are a working example of how the survival of elephants can be reconciled with the livelihoods of farmers."

Since its founding, the Elephant Pepper Development Trust has served up to 250 farmers in the valley, and in 2003, the Trust was awarded a \$108,000 grant from the World Bank. The trust also formed two companies, the African Spices Company in Zambia, and the Chilli Pepper Company in Zimbabwe. Due to social and economic unrest currently raging in Zimbabwe, the Trust's operations there have ceased, opting instead to continue production in Johannesburg, South Africa. The Elephant Pepper Development Trust is currently investigating how to distribute their hot sauce products in the United States. For more information, visit www.elephantpepper.org , or send an email to cpc@elephantpepper.org *Source: Wildlife Conservation Society, 28 July 2005*

Cause of Tibetan Antelope Migration Found

Wildlife scientists have found that some specific groups of Tibetan antelopes migrate northward every May to give birth in northwest China. The discovery was made by George Schaller, from New York-based Wildlife Conservation Society (WCS), and 10 Chinese scientists during a survey from 10 June to 20 July this year at the western Kunlun Mountain range.

In mid-June, the Tibetan antelopes from the Qiangtang Nature Reserve in Tibet gathered at a highland with an elevation of 5,000 meters in the western Kunlun Mountains in Xinjiang Uygur Autonomous Region to give birth, according to the survey. By 5 July , due to heavy snowfall in the region, the herds moved southward with the newborns. By 13 July most of the migratory Tibetan antelopes had left the area and returned to Tibet . Schaller said he was not sure about the exact reproduction site in previous surveys, but found it this time.

Tibetan antelopes, which are included on the state protection list for their uniqueness, are scattered around the 600,000 square kilometers of highland in Tibet, Qinghai and Xinjiang. Due to rampant poaching, the animal's population shrank sharply during the last century. *Source: chinaview.com 8-18-05*

Metroparks Zoo Rescues Endangered Frogs

The Cleveland Metroparks Zoo has rescued the world's last population of an endangered frog species ravaged by disease. Twelve Panamanian golden harlequin frogs (*Atelopus varius*) were collected from the wild, where a disease called chytrid threatened to destroy them. The disease, short for chytridiomycosis, causes the skin of an amphibian to become impermeable to water and oxygen, eventually killing them. The frogs can be treated for the chytrid in captivity, yet there is no known way to eradicate the disease from the wild.

The zoo said they will keep one breeding pair of frogs and the offspring. The rest of the animals were sent to the National Amphibian Conservation Center in Detroit, Mich. The zoo said it hopes to build a captive population and hoped that the animals could return to the wild one day. Until recently, the frogs were extremely common in Panama, known as pets and good luck charms. *Source: NewsNet5, 9 August 2005*

World's biggest aquarium?

Bernie Marcus, founder of the Home Depot stores, plans to open the world's largest aquarium in Atlanta, GA. The Georgia Aquarium, as it will be called, is scheduled to open in November. It will have five million gallons of water and more than 100,000 fish. It will have giant groupers, octopuses and two white Beluga whales. The star attraction will be two whale sharks, the world's biggest fish, which can exceed 40 feet in length and, Marcus said, will be on display for the first time outside of Asia.

The aquarium is, *The Atlanta Journal-Constitution* said, the city's biggest economic opportunity since the 1986 Olympics. It is expected to revitalize downtown and to bring Atlanta the tourism business it believes it deserves. Marcus says he conservatively estimates the economic impact at \$1 billion over five years. Aquariums have done so well for other cities that they have become a municipal status symbol — one that Atlanta is somewhat late to acquire. Of the 36 aquariums in the United States accredited by the American Zoo and Aquarium Association, nearly half have opened in the past 15 years, including those in Las Vegas, Dallas and Chattanooga, TN. *Source: New York Times News Service*

AAZK Publications/Accessories Available

The following AAZK resource/reference publications in CD format and AAZK Logo Patches and Pins are available for purchase several ways. You may use the order form below; you may order online at www.aazk.org by either printing out an order form or using PayPal; or you may phone in your order at 1-800-242-4519 (U.S.) and 1-800-468-1966 (Canada) using either a Mastercard or Visa credit card. If sending in an order, please address to: AAZK, Inc., 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054 USA. Checks or money orders should be made payable to AAZK, Inc. in U.S. Funds ONLY.

Biological Information for Selected Mammals 4th Edition - The 1,396 page *Biological Information on Selected Mammal Species* CD covers a wide range from general, breeding, and young-rearing behavior to diet and physical descriptions of 590 species. The volume is in a PDF format allowing searches by Species (Common or Latin name); or Key words using the *Find* function; or by Species (Common or Latin name), Family; or Order using the *Bookmarks*. Table of Contents are given for Orders, Families, Species by Common Name, Species by Scientific Name, and Species by Order and Family. The Appendices cover a variety of information from behavioral patterns common to families (Bovoid displays) to taxonomy (Primates). References are listed by Order and Family. Prices: AAZK Member \$25.00 NonMember \$40.00

AAZK Enrichment Notebook, Third Edition - This 455-page publication includes many facets of animal enrichment and is indexed for easy reference. The sections include an Overview of Enrichment, Enrichment Links, Enrichment Suppliers, Suggested Guidelines (Bats, Bears, Birds, Carnivores, Fishes, Primates, Reptiles, and Ungulates), Safety Considerations, Lists of Browse Plants and Toxic Plants, Cookbook Recipes for Enrichment, Enrichment Ideas/Devices (organized by category), Sample Enrichment Forms currently used in zoological facilities, and an extensive Enrichment Bibliography. This is a searchable PDF format document utilizing Acrobat Reader which is included. Prices: AAZK Member \$25.00 NonMember \$40.00

Zoonotic Diseases, Third Edition - Searchable PDF Format • Hyper-linked Zoonotic Disease List • Updated Guidelines for Animal Care Personnel • Updated Hygiene and Disinfection Section • 82 pages of Information. AAZK Member \$9.50 NonMember \$12.00

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Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 10th of each month to: Opportunity Knocks/AKF, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054. Please include closing date for positions available, and when setting these dates keep in mind that because of bulk-mail, most readers do not receive their AKF until the middle of the month or later. There is no charge for this service and fax or e-mail listings of positions which become available close to deadline are accepted. Our Fax is (785) 273-1980; e-mail: akfeditor@zk.kscoxmail.com< Listing must be sent as MS Word attachment. To post a position on the AAZK website, have listing to email address above by the 25th of the month for posting on the first day of the following month. We are no longer located at the Topeka Zoo, so please note new address to avoid delays in processing.

Keepers/Vet. Technicians - Hattiesburg Zoo, Hattiesburg, MS

For more information regarding this position please contact John Wright, General Curator, Hattiesburg Zoo, Hattiesburg, MS 39401, (601) 545-4576, email: jwright@hattiesburgms.com. The Hattiesburg Zoo has an opening on its Animal Care team. We are seeking a career driven, creative, team-oriented individual. **Responsibilities:** This position will be responsible for, but not limited; daily husbandry, exhibit cleaning and maintenance, diet preparation and feeding, documentation, conditioning and training of collection, educational programs, and veterinarian assistance. **Requirements:** high school graduate (college degree preferred) and previous exotic animal care experience (paid or volunteer). This is a full-time position with state benefits, salary commensurate with experience and qualifications.

Elephant Handler - Ringling Bros. and Barnum Bailey® Circus

Interested persons should send a resumé to FODE Entertainment: Fax: 800-637-8914; Email: hshugerman@feldinc.com or call (941) 721-1215. EOE ... Drug-Free Workplace. We offer a competitive salary and benefits. If working with Elephants appeals to you, we have a great opportunity. Ringling Bros. and Barnum Bailey® Circus has immediate openings for elephant handlers who aren't afraid to work hard caring for our elephants. **Responsibilities:** include total animal care such as grooming, feeding, cleaning and exercising animals. You must be able to work flexible hours and must be able to lift/move up to 75 lbs. **Requirements:** Prior experience working with Asian Elephants in a Free-Contact environment is preferred. 100% travel throughout North America is required. Majority of travel is in the United States.

Lead Animal Supervisor - Herpetology/Aquarium Dept. - Abilene Zoological Gardens, Abilene, TX

Send resumé or direct inquiries to City of Abilene, Human Resources, P.O. Box 60, Abilene, TX 79604. Fax to (325) 676-6212, or e-mail terry.shuffield@abilenctx.com. Visit our website at www.abilenctx.com. This position will remain open until filled. EOE. Specific questions about the position can be answered by Doug Hotle/Curator, at (325) 676- 6451 or e-mail at doug.hotle@abilenctx.com. The Abilene Zoological Gardens and the City of Abilene, Texas are excited to announce that we are seeking a team-oriented individual to fill the position of Lead Animal Supervisor to oversee the Herpetology ... Aquarium Department. **Responsibilities:** The position will oversee and participate in the day-to-day care and maintenance of animals in their charge, their enclosures, facilities, and personnel. There will be a strong emphasis in participation in AZA conservation programs and psychological and environmental enrichment for the animals. The selected individual will play a leading role in the design and completion of the zoo's new Herpetarium. **Requirements:** for the position include an Associates degree in one of the life sciences, at least three (3) years experience in an accredited institution, with at least one (1) year in a supervisory role. Some mammal and horticulture experience is a plus. Must have strong communication skills both verbally and in writing. Experience with venomous and other potentially dangerous reptiles is required. Knowledge of aquatics (including sea water) and their life-support systems is desirable. This is a physical position requiring the ability to climb, stoop, and crawl regularly. Must be computer literate. Must have a valid Texas driver's license, or the ability to obtain one. Any combination of experience and education may be considered. Salary for the position is \$2207.25 per month (\$1,018.73 bi-weekly) and an excellent benefits package.

Supervisor (Herpetologist) - Dallas Zoo, Dallas, Texas

To apply: Submit resumé and City of Dallas employment application; available at <http://jobs.dallascityhall.org> look for SUPERVISOR II-ZOO (30024-35). **The position is opened until filled.** Specific questions related to this position should be directed to Ruston Hartdegen at (214) 671-0462 or email at RHARTDE@mail.ci.dallas.tx.us Starting salary range is \$37,604.00 to \$49,825.00 dependent on qualifications. **Closing Date: 15 October 2005.** The Dallas Zoo is seeking a Supervisor within the department of herpetology. **Responsibilities:** The Supervisor is responsible for the daily operations of the facilities, oversees the husbandry and care of our diverse living collection of over 120 species of amphibians and reptiles and plays an important role in the management of the collection. In addition, the Supervisor is responsible for training of staff, oversight of volunteers, interns, educational components of our program, and the development and participation in departmental and zoo wide research and conservation efforts. We are looking for a highly motivated herpetologist who can work with a team. **Requirements:** include a Bachelor's degree in life science, plus one (1) year experience in the care and handling of reptiles and amphibians including venomous animals or a five-year (5) combination of specified education and experience to qualify. Effective oral and written communication skills and basic computer skills required. Aquatic systems experience a plus. Must have a valid Class "C" drivers license and good driving record. Position requires a physical, drug/alcohol testing and TB testing.

Bird Keeper - Bronx Zoo (WCS), Bronx, NY

Send resum  with cover letter to: Wildlife Conservation Society, Human Resources, Box Bird 2300 Southern Blvd., Bronx, NY 10460 or submit your resume via email to hr@wcs.org , include the Box Bird in the subject line. The Wildlife Conservation Society seeks candidates for the position of Wild Animal Keepers in the Bronx Zoo's Bird Department. **Responsibilities:** Bird keepers are responsible for the well-being and care of a diverse collection of birds, maintaining natural habitat exhibits and public areas, enrichment, and record keeping. **Requirements:** A Bachelor's degree in a zoological field plus two (2) or more years of aviculture experience is desired, preferably in a zoo setting. Candidates must be enthusiastic, conservation oriented, energetic, and able to interact with other staff and the public. EOE. Competitive salary and benefits package.

Full-time Warden - Six Flags Great Adventure Wild Animal Safari Park, Jackson, NJ

Interested candidates should submit a resum  to: Karol Kempke, Human Resource Manager, P.O. Box 120, Jackson, NJ 08527. **Resumes being accepted until 10/31/05.** We are seeking applications for a full-time Safari Park Warden. The Safari Park consists of 1200 animals including birds, reptiles and mammals. **Responsibilities:** Applicants must have the ability to feed animals, clean houses, and general surroundings. **Requirements:** Applicants must have strength, ability and alertness to work with various species of animals within a Safari Park. Must be 18 years old, have valid driver's license, possess the ability to perform assigned duties in a safe & productive manner and be able to work in all types of weather conditions. Six Flags Great Adventure offers an excellent salary and benefits package. Six Flags is an "Equal Opportunity Employer"

Volunteer Animal Care Specialist Intern - Great Plains Zoo ... Delbridge Museum, Sioux Falls, SD

If interested, please send a cover letter and resum : Jay Tetzloff, Director of Animal Programs, Great Plains Zoo, 805 S. Kiwanis Ave., Sioux Falls, SD 57104. jtetzloff@gpzoo.org The Great Plains Zoo ... Delbridge Museum is offering an opportunity for education and experience for tomorrow's workforce. The Great Plains Zoo and Delbridge Museum of Natural History has several internship opportunities available to those interested in pursuing a career in Animal Care and Zoo Management. **General Statement of Duties -** The Animal Care Specialist Intern is responsible for assisting the Animal Care Specialist in the care and feeding of zoo animals including the cleaning and maintenance of buildings, grounds, and exhibits. **Responsibilities:** Assist the Animal Care Specialist in the general daily care of the animals in the assigned exhibit and holding areas. Maintains exhibits and holding areas in a clean and presentable condition at all times. Assist in the observation the animal collection for signs of illness, general lethargy, injury, and dietary problems. Responsible for other duties as assigned by the Senior Animal Care Specialist and/or the Director of Animal Programs. The Animal Care Specialist Intern reports directly to the Senior Animal Care Specialist and/or Director of Animal Programs. **Requirements:** Requires a high school diploma or GED certificate. Prefer candidates that are pursuing a degree in a zoological related field. Must be able to work weekends, holidays, and evenings as assigned. Must commit to a schedule; 300 hours is required for successful completion of internship. Must also maintain a valid drivers license. Must have the ability to follow oral and written instructions. Must be able to climb ladders/stairs, lift and carry crates/animals/feed weighing 70lbs., operate mowers, handle fire hose for cleaning, operate weed eaters, load and operate wheel barrows loaded up to 150 lbs., be agile and flexible to maneuver in and around animals within exhibits, corrals and holding areas. Must have strong communication skills as speaking to the general public is required. May be asked to complete season-long project as assigned by the Senior Animal Care Specialist and/or the Director of Animal Programs. Health and Safety: Must maintain current tetanus vaccination (5 years) and be willing to have annual TB test done. Must be able to lift and carry up to 70 lbs.

Aviculture Interns Wanted - The Hawaii Endangered Bird Conservation Program at the K auhou Bird Conservation Center (KBCC) on the Big Island of Hawaii and the Maui Bird Conservation Center (MBCC) on the island of Maui. For more information on internships at KBCC, please send a resum , cover letter and the names and contacts of three (3) references to: Tracey Goltz P.O. Box 39 Volcano, HI 96785 or fax: 808-985-7034. For more information on internships at MBCC, please send this information to: Richard Switzer 2375 Olinda Road Makawao, HI 96768 or fax: 808-572- 3574. **Responsibilities:** Daily tasks include husbandry duties such as: diet preparation, aviary and facility maintenance, behavioral observations of breeding birds, grounds keeping, predator control. **Requirements:** Applicant must be able to live with several roommates in a remote area and should show enthusiasm for work with captive endangered Hawaiian birds. Applicant must have a valid driver's license and health insurance. Internships last for a 3-6 month period. Interns receive \$20/day stipend plus housing.

Big Cat Internships - Tiger Creek Wildlife Refuge, Tyler, TX

For more information or to download an Application Packet, see <http://www.tigercreek.org/internships.html>, no telephone calls please, all applicants must complete the Application Packet process for consideration of program participation. The Big Cat Internship as seen on Animal Planet involves Animal Care Apprenticeship and Public Educational presentations involving Big Cats This is a 90-day position (by 4 quarters/terms) allowing one to gain experience in the zoological field. **Responsibilities:** Job duties include cleaning, diet preparation, light maintenance, educational tours, etc. Interns are responsible for the daily cleaning and health monitoring of a large number of exotic feline species including but not limited to tigers, lions, leopards and pumas. Big Cat Internship opportunities also include working in environmental education with schools and youth groups in a variety of learning activities. Interns will present short guided lessons on animal care techniques, conservation and rescue methods, backgrounds on the big cats and much more. This wide variety of teaching opportunities and educational training provides the intern with an exciting array of new skills and experiences. Training is

provided by the staff. **Requirements:** At least two (2) years of undergraduate college work in wildlife management, education, biology, or related field. If no college experience then two (2) years of verifiable work experience in unrelated field or one (1) year of work experience in animal care field. All applicants must be at least 20 years of age by start date. These positions require motivated persons with a career focus in biology/zoology/wildlife management. Housing is provided for these non-paying positions. Interns provide a strong commitment to the refuge, with a six-day work week and light duties on Sundays.

Environmental Interpretation and Wildlife Care Internship - Trailside Museums and Wildlife Center, Bear Mountain State Park, Bear Mountain, NY 10911-0427. Contact: Jennifer Verstraete at (914) 786-2701 ext. 278 or 265; email - claync.keith-feller@oprhp.state.ny.us. Start Dates: Summer internship mid-May through mid-August; Fall internship late-August/early September through early November. Internship is unpaid, but provides knowledge and experience; written evaluation gladly given. Possible course credit if intern can arrange it. Interns will work at least three (3) days a week, including one weekend day. No housing available. We reimburse full payment for required pre-exposure rabies series. **Qualifications:** Enthusiasm, comfortable handling animals, motivated to learn. Must be 18 or older; preference given to college student looking for experience in the care of wildlife and in environmental interpretation. **Responsibilities:** 1) Provide care for permanently injured or orphaned park wildlife (mammals, birds, fish, amphibians and reptiles) in zoo setting. Under the supervision of a Senior Zookeeper will prepare food and diets, maintain enclosures and exhibits, and provide enrichment; 2) Interact with the public answering questions, interpreting exhibits, possibly developing and offering short interpretive talks.

Internship - (Tigers For Tomorrow Exotic Animal Preserve) Fort Pierce, FL.

To apply send cover letter and resumé to: Susan Steffens/ Executive Director- Tigers For Tomorrow, 18905 Orange Ave, Ft. Pierce, FL or email to Sue@tigersfortomorrow.org. This non profit organization is seeking two (2) possibly three (3) student interns for the 2005 fall season. Tigers For Tomorrow is a last stop exotic animal rescue preserve that houses and specialize in big cats. The preserve is in the beginning stages of moving to a new facility, interns will assist management in the move and care of the animals. **Responsibilities:** The intern will assist in the daily husbandry of preserve residents, assist in interpretive talks, work with the public. **Requirements:** Desirable qualifications include the ability to communicate effectively with people, writing skills, orientation to details, and be a self-motivator. Benefits include room and board, and \$50.00 a week. Personnel transportation is required.

More Zoo vacancies can be seen by visiting:

American Zoo and Aquarium Association - Job Listings
<http://www.aza.org/JobListings/>

American Association of Zoo Keepers - Opportunity Knocks
http://www.aazk.org/aazknew/animalKeepersForum/opportunity_knocks.asp

European Association of Zoos and Aquaria - Vacancies
<http://www.eaza.net>

Australasian Society of Zoo Keeping (ASZK)
<http://www.aszk.org.au/Zoo%20Positions%20Vacant.htm>

Berufsverband der Zootierpfleger e.V
<http://www.zootierpflege.de/stellen/stellenzooseiten/STzoowebseiten.html>

Zoo Vets, Technicians and interns
http://www.aazv.org/job_openings.htm

Bird Jobs in the Field
<http://www.birdingonthe.net/maillinglists/BJOB.html>

AAZK Membership Application

check here if renewal []

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Zoo Address _____

Title _____

Work Area _____

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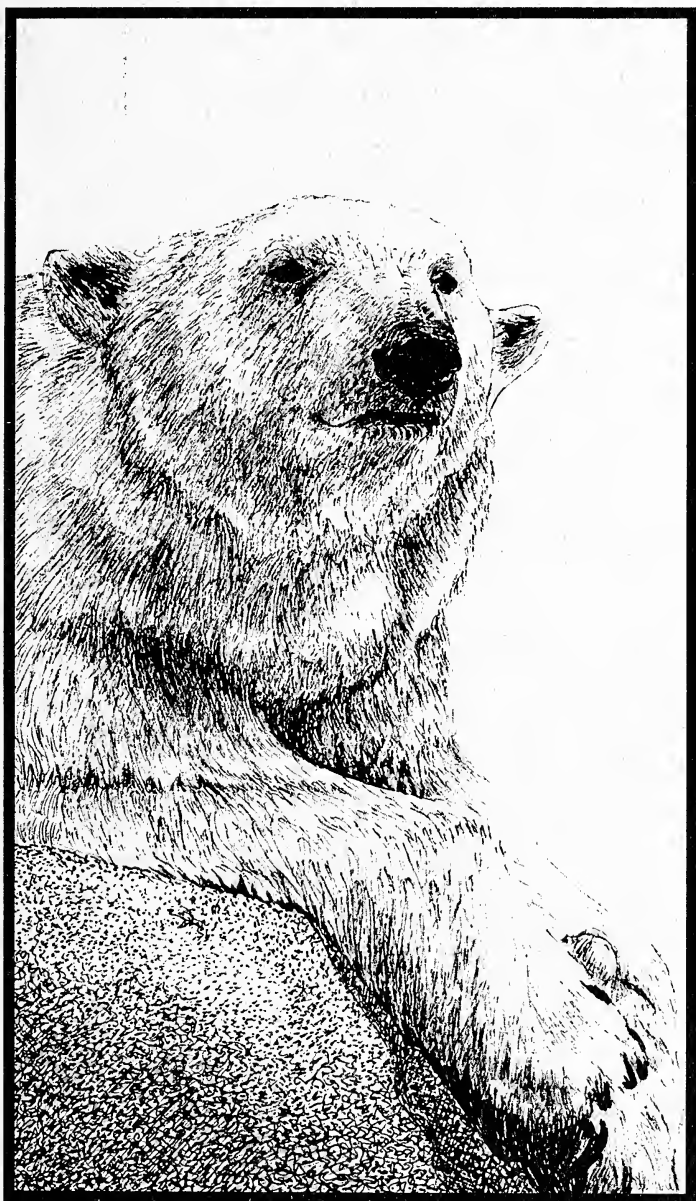
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30th Anniversary
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ANIMAL KEEPERS' **FORUM**



**The Journal of the American
Association of Zoo Keepers, Inc.**

NOVEMBER 2005

Managing Editor: Susan D. Chan • **Associate Editors:** Kayla Grams, Grand Junction, CO & Mark de Denus, Reid Park Zoo • **Enrichment Options Coordinators:** Dawn Neptune, Utah's Hogle Zoo & Rachel Cantrell, Disney's Animal Kingdom • **Legislative/Conservation Outlook Column Coordinator:** Georgann B. Johnston, Sacramento, CA. • **ABC's Column Coordinator:** Diana Guerrero, Big Bear Lake, CA • **Reactions Column Coordinator:** William K. Baker, Jr., Little Rock Zoo

Animal Keepers' Forum is published monthly by the American Association of Zoo Keepers, Inc., 3601 S.W. 29th Street, Suite 133, Topeka, KS 66614-2054. Ten dollars of each membership fee goes toward the annual publication costs of Animal Keepers' Forum. Postage paid at Topeka, KS.

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also serves as AAZK Liaison to the American Zoo & Aquarium Association (AZA)

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Resources for Crisis Management in Zoos & Other Animal Care Facilities, Vol. 2 - Susan D. Chan, Topeka, KS;
William K. Baker, Little Rock Zoo, AR; Diana Guerrero, ArkAnimals, Big Bear Lake, CA



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1974 - 2004

About the Cover.....

This month's cover features a Polar Bear (*Ursus maritimus*) drawn by Elena Chelysheva, a former Curator of Mammals at the Moscow Zoo in Russia. Scientists believe that the "sea bear," evolved about 200,000 years ago from brown bear ancestors. Polar bears are the world's largest land predators and at the top of the food chain in the Arctic, where they dine primarily on seals. They range throughout the Arctic in areas where they can hunt seals at open leads. The five "polar bear nations" where this species is found include the U. S. (Alaska), Canada, Russia, Denmark (Greenland), and Norway. Adult male polar bears weigh from 775 to more than 1,500 pounds. Females are considerably smaller, normally weighing 330 to 550 pounds. Female polar bears usually have two cubs. Though mating takes place in April or May, the fertile ova are not implanted until the following fall when the mother prepares to go into the den. (This process is known as delayed implantation.) The female polar bear gives birth to her cubs about two months after she enters the den. Newborns are 12 to 14 inches long and weigh little more than a pound. Females in the Low Arctic wean their cubs as they approach their second birthday, while those in the High Arctic, where conditions are more demanding, care for their cubs an additional year. Young bears are considered "subadults" until they reach maturity at age five or six. Those polar bears that manage to survive to adulthood have learned to master the challenges of arctic life. The annual mortality rate of adult bears is surprisingly low--as little as 5% a year. Their only real predator is man. Thanks, Elena!

Animal Keepers' Forum publishes original papers and news items of interest to the animal keeping profession. Non-members are welcome to submit articles for consideration. Articles should be typed or hand-printed and double-spaced. Authors are encouraged to submit their manuscripts on a disk as well as in hard copy form. Manuscripts submitted either on disk or electronically as attachments to an email should be submitted in Microsoft WORD. All illustrations, graphs, charts and tables should be clearly marked, in final form and should fit in a page size **no greater than 5.5" x 8.5"** (14cm x 22cm). Literature used should be cited in the text (Brown, 1986) and alphabetically in the final bibliography. Avoid footnotes. Include scientific name (as per ISIS) the first time an animal name is used. Thereafter use common name. Use metric system for weights and measurements (standard equivalents may be noted in parenthesis). Use the continental dating system (day-month-year). Times should be listed as per the 24-hour clock (0800, 1630 hrs. etc.). Glossy black and white **or** color prints (minimum size 3" x 5" [8cm x 14cm]) are accepted. Clearly marked captions should accompany photos. Please list photo credit on back of photo. Photographs may be submitted electronically as either JPEG or TIFF file attachments.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for *AKE*. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the editor. The editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or email contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone 1-800-242-4519 (US); 1-800-468-1966 (Canada); FAX (785) 273-1980; email is akfeditor@zk.kscoxmail.com

**Deadline for each regular issue is the 10th of the preceding month.
Dedicated issues may have separate deadline dates and will be noted by the editor.**

Articles printed do not necessarily reflect the opinions of the *AKE* staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

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E-Mail Addresses: You may reach Barbara Manspeaker at AAZK Administrative Offices at: aazkoffice@zk.kscoxmail.com You may reach Susan Chan and *Animal Keepers' Forum* at: akfeditor@zk.kscoxmail.com

AAZK website Address: www.aazk.org

BFR Website: <http://aazkbfr.org>



From the Executive Director

Ever so slowly, we are starting to re-establish communication with the Audubon Chapter in New Orleans. Sadly, many of the staff have lost their jobs, as the zoo and associated facilities are working with core staff members only. A very fluid timeframe to re-open the Audubon Park Zoo has been tentatively scheduled for sometime soon after the first of the year.

Many employees from Audubon have been fortunate enough to find work at other institutions across the country. It must have been very hard to work side-by-side with keepers on a daily basis, and now they're gone, off to other jobs, and some folks did not even get the opportunity to say goodbye to co-workers.

Many, many delegates have asked about their conference registration, and if they can donate the registration fee to the Katrina relief effort. For those of you who were registered delegates for the New Orleans Conference, we'll be in touch soon, regarding registration refunds or the disposition of funds. The same holds true if you were registered for a pre/post conference trip. If you donated an auction item, miraculously they all survived Katrina and the floods. Most items will most likely appear in future AAZK Conference auctions.

Finally, please remember the Katrina relief effort being coordinated by AAZK. By donating your funds to this effort, you will be helping your fellow keepers and associated staff members of the Audubon Institute get back on their feet. Donations can be made through the Web Site of the Association (www.aazk.org), or by sending a check or money order to the Association Offices (checks should be made payable to AAZK Hurricane Relief Fund). I do hope that many AAZK members and Chapters can help these folks out in their time of need.

Ed Hansen
Executive Director/AAZK



Coming Events

Reptile and Amphibian Training and Enrichment (R.A.T.E.) Workshop - 8-10 December 2005 at Disney's Animal Kingdom, Lake Buena Vista, FL. For more information about R.A.T.E., the national workshop and/or the listserve and how you might participate, please contact Andy Daneault (andre.j.daneault@disney.com) or Vance Alford (vance.c.alford@disney.com).

16th Biennial Conference on the Biology of Marine Mammals - 12-15 December 2005 in San Diego, CA. Organized by The Society for Marine Mammalogy. For information see <http://www.marinemammalogy.org/2005%20SMM%20Biennial.html>

Third International Tapir Symposium - 26-31 January 2006 in Buenos Aires, Argentina. For info email tapirtalk@uol.com.br

14th Annual Conference of The International Association of Avian Trainers and Educators (IAATE) - 15-18 February 2006 in Nashville, TN. This year's theme is "Soaring to New Heights". The conference is being hosted by the Nashville Zoo at Grassmere, at the Nashville Sheraton Downtown Hotel. For further information, please visit www.iaate.org. You can also contact Alicia Douglas (aliciadouglas78@yahoo.com) or Jacqueline Walker (jwalker@nashvillezoo.org).

AZA Eastern Regional Conference - 26 March - 1 April 2006 - hosted by the Jacksonville Zoo, Jacksonville, FL. See <http://www.aza.org/ConfWork/AboutRegWork/#fut>

AZA Western Regional Conference - 24-29 April 2006 hosted by Vancouver Aquarium in Vancouver, British Columbia. See <http://www.aza.org/ConfWork/AboutRegWork/#fut>

Second International Congress of Zookeeping (ICZ) 7-11 May 2006 in Gold Coast, Queensland, Australia. Visit website: <http://www.iczoo.org> for latest information.

2006 International Gorilla Workshop - 23-26 June 2006 at Paignton Zoo, Devon, England. Paignton Zoo will be host. We would like to invite gorilla workers from all disciplines to register. Deadline for submission of abstracts for presentation and for early registration is **31 December 2005**. Further info available at <http://www.paigntonzoo.org.uk/gorillas/gorillaworkshop.htm>

21st Congress of the International Primatological Society - 26-30 June 2006 in Entebbe, Uganda. For further info: wolupot@yahoo.com

First European Congress of Conservation Biology - 23-27 August 2006. Please visit <http://>

www.eccb2006.org for details and to register for new information.

33rd AAZK National Conference - 15-20 September 2006. Hosted by the Lincoln Park Zoo AAZK Chapter and the Lincoln Park Zoo, Chicago, IL. See information at their website www.azk2006.org

AZA Annual Conference - 25 - 30 September 2006. Hosted by Busch Gardens, Florida Aquarium, & Lowry Park Zoo, Tampa, FL. See information at their website <http://www.aza.org/ConfWork/AboutAnnualConf/#fut>

Protected Contact Training & Enrichment Workshop

Spring 2006 - Exact dates to be announced

Presented by Active Environments and hosted by Zoo Atlanta, Atlanta, GA. Active Environments is proud to present the Third Elephant Protected Contact Training and Enrichment Workshop, hosted by Zoo Atlanta. This 4 1/2-day workshop is designed for keepers, managers, supervisors, curators, and veterinarians working with both Asian and African elephants. Workshop curriculum will focus on the fundamentals and practical application of protected contact as a comprehensive system for the management of captive elephants through classroom instruction, discussion, group activities, demonstrations with elephants and other species, and hands-on training opportunities with elephants and other species. Workshop content will also include: designing and sustaining an effective environmental enrichment program; behavioral problem solving; foot care; exercise program design; medical management through voluntary cooperation; physical restraint and immobilization; and protected contact facility design. Registration is limited to 25 participants. The Workshop format is designed to maximize the value for each participant and as much as possible to address specific situations, needs, problems, and objectives. Be prepared to interact, share, and participate to make the experience as useful and relevant to you as possible. The registration fee (to be determined) includes the following: all workshop materials; all breakfasts, lunches, and one dinner; graduation ceremony and banquet; transportation to and from the Atlanta airport; transportation to and from the Zoo each day; and commemorative Workshop T-shirt. For further information contact: Active Environments, Inc., 7651 Santos Road., Lompoc, CA 93436; Tel: 805-737-3700; Fax: 805-737-3705; E-mail: active_environs@ix.netcom.com or Adam Stone (Zoo Atlanta) astone@zooatlanta.org or Margaret Whittaker (Active Environments) indu22@earthlink.net

Post Your Coming Event Here - email to:

akfeditor@zk.kscoxmail.com

AAZK Announces New Members

New Professionals Members

Sarah daSilva, **Buttonwood Park Zoo (MA)**; Heather Grierson, **Acadia Zoo (ME)**; Jill I. Forsbacka, **Buffalo Zoo (NY)**; Daniel Boritt, Erin Stromberg, Susanne Mount and Debi Talbott, **National Zoo (D.C.)**; Bradley Hange, no zoo listed, **Ellicott City, MD**; Deborah Graham, **Salisbury Zoological Park (MD)**; Jeanne Lashley, **Busch Gardens (FL)**; Candice Lea Hodges, Caryn Wichenfeld, and Laura Lynch, **Knoxville Zoological Gardens (TN)**; Timothy J. Davies, **The Ark R.A.I.N. Foundation Wildlife Sanctuary (TN)**; Charles Coody, **Jackson Zoological Park, (MS)**; Amy C. Hanna, **Lincoln Park Zoo (IL)**; Jessica Lench Porter, **Niabi Zoo (IL)**; Kathleen Koster, **Omaha's Henry Doorly Zoo (NE)**; Kathryn Perry, **Alexandria Zoo (LA)**; Wendy L. Williams, **Little Rock Zoo (AR)**; Teryle Scott, **Los Angeles Zoo (CA)**; Maya Seaman, no zoo listed, **Daly City, CA**; Thomas Knight, **San Francisco Zoo (CA)**; Katherine Weil, no zoo listed, **Portland, OR**; Liz Rudisil, **Woodland Park Zoo (WA)**; and Jamie Logan, **Alaska Zoo (AK)**.

New Contributing Members

Ronald Javitch
Montreal, Quebec, Canada

Renewing Contributing Members

Steve H. Taylor, Director
Cleveland Metroparks Zoo, Cleveland, OH

William H. Disher, Volunteer
San Diego Zoo & Wild Animal Park
San Diego, CA

Renewing Institutional Members

Louisiana Purchase Gardens & Zoo
Monroe, LA
Everett Harris, Director

Central Park Zoo
New York, NY
Dr. Dan Wharton, Director

Cosley Zoo
Wheaton, IL
Susan Wahlgren, Director

Bowling For Rhinos Update

Bowling For Rhinos 2005 has already broken records. We broke records last year at over \$214,000 and this year we have nearly raised **\$216,000**. Way to go AAZK Chapters!

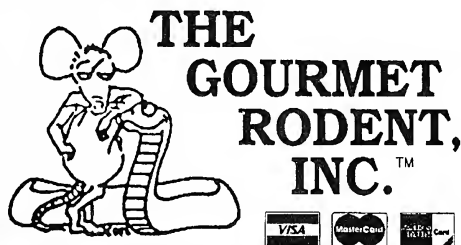
There are still several Chapters that have not turned in their 2005 funds. If you are one of those, please send your funds (checks payable to: AAZK, Inc) to: Patty Pearthree, c/o BFR, 318 Montibello Dr., Cary, NC 27513.

PLEASE note new BFR website address: <http://www.aazkbfr.org>. Check it out & see if your Chapter's funds have been received & let me know if your contact information is up-to-date. My new email is ppear3@pear3.org.

A huge thank-you goes out to these top four fundraisers (see Scoops in Oct. '05 issue of *AKF*)! I'd also like to thank all the "behind-the-scenes" folks for all the hard work they put into making BFR successful. Please be sure to thank and recognize these folks in your zoos as I am not always aware of the efforts they put forth.

**AAZK's Bowling For Rhinos has
now raised nearly \$2.4 million
for conservation.**

Thanks to ALL OF YOU!!!



RATS AND MICE

Bill & Marcia Brant

6115 SW 137th Ave., Archer, FL 32618

(352) 495-9024

FAX: (352) 495-9781

e-mail: GrmtRodent@aol.com

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AAZK Publications/Accessories Available

The following AAZK resource/reference publications in CD format and AAZK Logo Patches and Pins are available for purchase several ways. You may use the order form below; you may order online at www.aazk.org by either printing out an order form or using PayPal; or you may phone in your order at 1-800-242-4519 (U.S.) and 1-800-468-1966 (Canada) using either a Mastercard or Visa credit card. If sending in an order, please address to: AAZK, Inc., 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054 USA. Checks or money orders should be made payable to AAZK, Inc. in U.S. Funds ONLY.

Biological Information for Selected Mammals 4th Edition - The 1,396 page *Biological Information on Selected Mammal Species* CD covers a wide range from general, breeding, and young-rearing behavior to diet and physical descriptions of 590 species. The volume is in a PDF format allowing searches by Species (Common or Latin name); or Key words using the *Find* function; or by Species (Common or Latin name), Family; or Order using the *Bookmarks*. Table of Contents are given for Orders, Families, Species by Common Name, Species by Scientific Name, and Species by Order and Family. The Appendices cover a variety of information from behavioral patterns common to families (Bovid displays) to taxonomy (Primates). References are listed by Order and Family. Prices: AAZK Member \$25.00 NonMember \$40.00

AAZK Enrichment Notebook, Third Edition - This 455-page publication includes many facets of animal enrichment and is indexed for easy reference. The sections include an Overview of Enrichment, Enrichment Links, Enrichment Suppliers, Suggested Guidelines (Bats, Bears, Birds, Carnivores, Fishes, Primates, Reptiles, and Ungulates), Safety Considerations, Lists of Browse Plants and Toxic Plants, Cookbook Recipes for Enrichment, Enrichment Ideas/Devices (organized by category), Sample Enrichment Forms currently used in zoological facilities, and an extensive Enrichment Bibliography. This is a searchable PDF format document utilizing Acrobat Reader which is included. Prices: AAZK Member \$25.00 NonMember \$40.00

Zoonotic Diseases, Third Edition - Searchable PDF Format • Hyper-linked Zoonotic Disease List • Updated Guidelines for Animal Care Personnel • Updated Hygiene and Disinfection Section • 82 pages of Information. AAZK Member \$9.50 NonMember \$12.00

Publication prices include domestic and Canadian shipping. For overseas orders, please add \$5.00 per CD for Air Mail service.

The New AAZK Logo is now featured on both patches and enameled lapel pins. The colors are tan, rust, burgundy, grey and blue with a black border. Patches (4" x 3") cost \$8.00 each. Lapel pins are \$6.00 each. Prices include domestic and Canadian shipping. This price covers postage for one (1) pin or one (1) patch to overseas addresses. For orders from 2-6 patches or pins, overseas orders **must** add \$2.00 additional for shipping.

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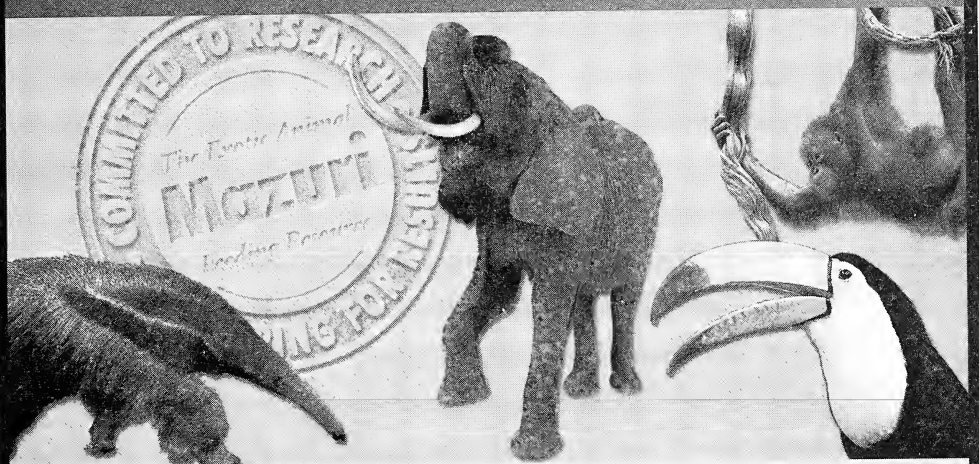
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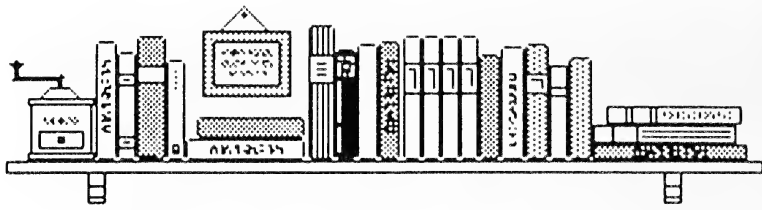
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Book Reviews

Amphibians and Reptiles: Status and Conservation in Florida

Edited by Walter E. Meshaka Jr. & Kimberly J. Babbitt
Krieger Publishing Company, P.O. Box 9542, Melbourne, FL 32902-9542
Original edition 2005
ISBN 1-57524-251-6
334 pp. Hardcover \$66.50

*Review by Jeremy Konwiser, Animal Keeper
The Living Desert, Palm Desert, CA*

Amphibians and Reptiles, Status and Conservation in Florida is a collection of essays, research, and reviews by 27 different contributors, all dealing with Florida's diverse herpetofauna. The book starts by listing figures, tables, and contributors and also contains a brief introduction. The main text is divided into six parts. Each part contains submissions on a common theme central to herp status and conservation. A thorough appendix, consisting of county records of native amphibian and reptile species in Florida, and a list of literature cited round out this substantial book.

Part I of the book deals with an overview of Florida's herpetoculture, and sets the stage for the reader. Subsequent parts deal with habitat loss, alteration, and fragmentation, public lands, commercial harvesting, and exotic species. Each part is further broken down into sections, for example, Part III Public Lands is divided into uplands, wetlands, rivers, and estuarine systems. Within each section is work related to that topic; under the estuarine systems section you can find *Insular Ecology of the Florida Keys Reptiles* as well as *The Diamondback Terrapin in Florida Bay and the Florida Keys: Insights into Turtle Conservation and Ecology*.

Throughout the book the reader will find clear and concise graphs, charts, tables, maps and other figures to support the given data but you will not find any photographs. The text is accessible to those who have a scientific background, but is a little beyond the reach of casual readers. It is not a coffee table book, is not suitable for a field identification guide, and probably won't be read for pleasure. This book definitely has a place in the classroom, especially for students in Florida dealing with native wildlife. It would also be a useful tool for state officials in wildlife management positions. *Amphibians and Reptiles, Status and Conservation in Florida* effectively brings together a broad picture of the conservation status of Florida's herpetofauna, and serves notice that much more work is needed to ensure a place for these native creatures.

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ABC's

ABC's: Animal Behavior Concerns and Solutions

A Question & Answer Forum for Animal Professionals

©2005 by Diana Guerrero, Independent Behavior Consultant
Ark Animals of California, Big Bear Lake, CA



Question

We are working at our first attempt at training a camel. Can you give us some guidelines and talk about how to address the friskiness?

Answer

Traditional camel training involves three steps: Teach handling tolerance, lead manners and weight bearing. Weight bearing acclimation is important to introduce but needs to be trained when the animal is a bit older. I am going to chat about a few points related to your question and then get into more specific areas and useful resources next month.

Handling Tolerance

Activities should include husbandry work such as brushing, cleaning (hosing), picking up feet, examining any part of the anatomy, etc. The camel trainers say that 90% of the work in training this type of animal stems from the foundation you set up early on to make this animal gentle and not afraid.

For young animals you could use a small dog collar on the neck from an early age and ease into leading the animal within a week and through about three months. At that time you could introduce a halter and lead with that. I don't know when you started work with this animal but hope that you are already in the halter.

Babies don't have much brain matter and leading them back and forth while working with the mother is a good strategy....unless the mother is not amiable to training. Teach your critter to tie only for short periods of time and under strict supervision.

Don't forget to train the baby to load and unload into a trailer or similar transport medium and get the baby into a wide variety of environments. Many of the camels you see in public have been going to events and outings since they were very small. This desensitizes them to a wide variety of noises and other activities and makes them into more stable, calm, and reliable animals.

Cush?

Cush (kneeling) is popular but is probably not high on the priority list. The rule of thumb is that if you are going to teach "cush," do so between six months to a year of age and after you have some good behavior patterns established.

Frisky Dangers

Young animals are always frisky but the earlier you start work, the better your chances of establishing a solid foundation and good manners. Teaching limits and nipping bad behavior in the bud before it escalates are your best approaches here.

Nipping and bouncing can be very dangerous to handlers or the public. To develop a stable and well-mannered animal you need to remember to be consistent, assess and predetermine your training steps and any consequences.

You did not specify if the mother is in proximity when you are working. If the animal is still really attached to “mom” you will experience “acting out” during separation. It might be best to work in close proximity and teach tolerance to husbandry behaviors, restraint, and acceptance of tack. Then you can begin to increase distance from the yard, barn, and other animals.

Training to Lead

I’d suggest using a horse with a rider (or use mom—if she is trained) to lead this animal initially. That way you keep moving even though the animal is kicking up a fit. The handler rides and holds (or secures the lead rope to the saddle horn). As you move forward slowly, it requires the animal to follow. This takes advantage of the natural predisposition of the youngster to follow behind the lead animal.

The perk is that as you continue to move forward, you are not reinforcing resistance and the animal does not learn that bad behavior (bouncing, kicking, screaming) stops the procession or gives her control. If the keeper is currently waiting on the ground for the animal to quit kicking up a storm—it could be reinforcing that behavior and you certainly don’t want to do that.

The leading activity on horseback also trains the animal to yield to the line, just as tying does. The added perk of this strategy is that the keeper handling the animal is not put at risk from the young animal’s acrobatics.

When you take advantage of the instinct to follow you will also want to keep her safely moving forward. If using a horse is not an option and you have to do ground work, then use team training methods. Two keepers are needed. One keeper on each side will have a lead rope that connects to the head halter. The two leads allow you to maintain control and distance. However this poses more risk to the animal and to the handlers.

You didn’t specify if you were using a collar on the young animal or a head halter. Most camels are halter trained at about six months of age. So if you are not on the head halter yet, train the animal to accept it.

Other Tidbits

Many camel experts recommend the separation of animals for training. Check the natural history of the species you are working with to determine optimal times. Generally short separations should occur at a young age and removal around six to seven months or so would be reasonable. The ideal situation would be if you had a youngster group to integrate your trainee into.

If you are going to attempt saddle or cart work, train the cart first and wait until 2-2.5 years before you seriously begin teaching weight bearing. This is an age where the animal is physically and mentally adept so that you can avoid stress and injury of both the animal and the humans!

Next Month: Seven Camel Training Suggestions

About the columnist: Since 1978 Diana L. Guerrero has worked professionally with both wild and domestic animals. Guerrero has been affiliated with and certified by a variety of animal programs in the USA and Europe. Information on her animal career programs, teleseminars and other projects are available through her website www.arkanimals.com. Questions for ABC’s should be submitted to Diana by phone at (800) 818-7387, directly through the ABC’s questionnaire or email on her website or via regular mail: c/o ARKANIMALS.COM, P.O. Box 1989 PMB 215, Big Bear Lake, CA 92315 USA.

Occurrence of Mucous Stools in Spectacled Bears (*Tremarctos ornatus*)

By

Wendy Gardner, Keeper, Woodland Park Zoo, Seattle, WA; formerly a Keeper at Zoo Atlanta
and

Rebecca J. Snyder, Curator of Giant Panda Research & Management, Zoo Atlanta, Atlanta, GA

Introduction

Many zoos are not able to feed their animals the same diet they would have in the wild because it may be too expensive, not be available or it may be controversial (e.g., feeding carcasses or live animals can be deemed inappropriate by zoo visitors). In some cases feeding diets different from the wild diet may cause stool consistencies to be different in captive animals compared to their wild counterparts. Zoo staff monitor stool consistency as one measure of an animal's health and note any changes.

While working with a pair of spectacled bears, (*Tremarctos ornatus*) I noticed that mucous stools were passed at various times throughout the year. It seemed to coincide with decreased consumption of these bears' main diet, omnivore biscuits (pers.obs.). The bears did not show any obvious changes in health or behavior when these types of stools occurred, and nothing unusual was found when the veterinary staff conducted fecal/mucous tests. This led animal care staff to believe that passing mucous may be a normal occurrence. Other institutions were asked if they had observed anything like this in their spectacled bears, and a couple of institutions reported similar observations.

My next exposure to mucous stools came while I was working with giant pandas (*Ailuropoda melanoleuca*). Most captive giant pandas pass mucous stools with the frequency per year varying from one animal to another (per. comm. with other giant panda keepers). Giant pandas tend to show behavioral changes associated with passing mucous, ranging from decrease in appetite (i.e., eating less bamboo, biscuits and fruits), restlessness (e.g., increase in locomotion/pacing), to being curled up in a ball and honking (a distress vocalization). Once the mucous stool or stools are passed, the animal usually starts eating and its behavior returns to normal.

Giant pandas have a high density of mucous producing cells in the lining of their gut that presumably aids in the passage of fibrous bamboo fragments (Schaller et al., 1985). It is possible that excess mucous may be sloughed from the gut periodically and that this is a normal function for this bear species. It is also possible that a decrease in bamboo consumption may contribute to the increased frequency of mucous stools being passed. (panda keeper obs).

Given the close affinity between spectacled bears and giant pandas (Talbot and Shields, 1996), and the limited number of giant pandas housed in North American zoos, the factors potentially associated with the occurrence of mucous stools in spectacled bears were examined. The goal of the study was to determine the frequency of occurrences of mucous stools in the captive North American spectacled bear population and evaluate the effect of variables such as sex, age, and diet on the frequency of mucous stools.

Subjects

A total of 81 surveys were sent to North American facilities. Fifty-three surveys were returned, providing data for 32 males and 21 females. The age range of the subjects was 4–25 years. All subjects were captive born.

Data Collection

A 28-question survey was sent to 35 North American facilities housing spectacled bears. Bear keepers were asked to report the number of mucous stools passed each month and to answer questions about

diet, enrichment, health, behavior changes, age and sex. A separate survey was provided for each subject. The survey was divided into two different sections, one for animals that passed mucous stools and one for those that did not. This made it easier to compile the data and quicker to fill out the survey. Respondents were asked to list all food items and amounts provided for the regular daily diet. If the subject had a mucous stool, keepers were asked to provide the month or months in which these stools occurred, the number of stools passed and the approximate size of each stool. Respondents were also provided with lists of food items and asked to check off those provided to the subject as well as how often the item was provided.

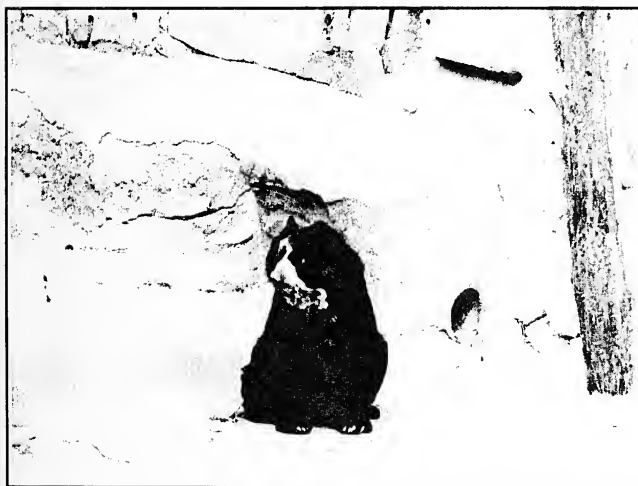
Data Analysis

The frequency of mucous stools per year was calculated as a yearly rate. A Mann-Whitney U test was used to determine if there were sex differences in the yearly rates of mucous stools (Siegel and Castellan, 1988). To determine the effect of diet on yearly rate of mucous stools, subjects were classified according to the frequency and type of diet and food enrichment they received. A chi-square test was then used to determine the effect of different food types on the rate of mucous stools (Sheskin, 2000). Specifically the effects of the following food types were examined: browse, meat, omnivore biscuit, dog food and eggs.

Results

No significant sex differences were found in the yearly rate of mucous stools ($U=366$, $n=52$, $p=0.588$).

No significant relationship was found between any of the food types tested and the occurrence of mucous stools (browse: $\chi^2=0.283$, $p>0.1$; dog food: $\chi^2=0.344$, $p>0.1$, omnivore biscuits: $\chi^2=0.494$, $p>0.1$; meat: $\chi^2=2.61$, $p>0.1$; egg: $\chi^2=0.181$, $p>0.1$).



1.0 spectacled bear Migues at the Cheyenne Mtn. Zoo
(photo by Wendy Gardner)

Discussion

Even though giant pandas and spectacled bears are closely related, it has not been reported that spectacled bears have the same mucous producing gland in the lining of their gut as does the giant panda. Thus, it is interesting that some spectacled bears pass mucous stools similar to those passed by giant pandas, because it is thought that mucous stools derive from the sloughing of the gut lining in giant pandas.

Bamboo, a grass, makes up 98% of the giant panda's diet in the wild, (Schaller et al., 1985) and

some captive giant pandas receive this amount of bamboo as well. It appears that a decrease in bamboo consumption, and therefore a decrease in fiber, contributes to giant pandas passing more mucous stools (unpublished data). Plants, especially those in the bromeliad family, make up a large part of wild spectacled bears' diet, up to 92% (Dierenfeld, 1989) in some bears, which adds fiber and roughage to their diet. Therefore, I expected that spectacled bears in captivity that were not offered equivalent amounts of plant material or foods that provided enough fiber and roughage, might experience mucous stools. Foods that were a source of fiber and roughage fed to captive spectacled bears in this study included, browse (e.g., bamboo, willow, etc.) as well as omnivore biscuits and dog food. However, lack of these foods or minimal amounts of these foods was not found to be a significant factor in the occurrence of mucous stools. Eggs, sugar cane and bread were



1.0 spectacled bear cub Osito at the Cheyenne Mtn. Zoo
(photo by Wendy Gardner)

evaluated as well because they were not fed to all bears, and two bears were reported as having passed mucous stools after receiving sugar cane. These food items were not found to be a significant factor in the passing of mucous stools either. Fruits and vegetables were offered to all of the bears in the survey, and thus these foods were not analyzed. However, it has been suggested that fruit fed to captive spectacled bears may have more simple sugars and less fiber than fruits eaten by wild spectacled bears (Dierenfeld, 1989). Because captive spectacled bears' diets are comprised of a large amount of these fruits, it is a variable that could be studied in the future. There was not a lot of variability

in the diets and food enrichment offered to the bears in this survey. This may be one reason that these two factors were not found to significantly affect the occurrence of mucous stools.

Sex differences were not a significant factor in the occurrence of mucous stools in spectacled bears. Only 11 bears (6 males and 5 females) in this survey passed mucous stools and they were offered similar daily diets, as well as browse and enrichment. The effect of age class (i.e., sub-adult and adult) was not analyzed, because there were not enough bears in the sub-adult category. Spectacled bear cubs nurse for approximately eight weeks and are independent by the time they are between the ages of 6-8 months (Brown, 1993). This being the case, I did not expect that there would be a difference between sub-adults and adults in the frequency of mucous stools, because both age classes eat the same diet.

Having a larger sample size and analyzing specific types of fruits and vegetables in the subjects' diets may have yielded different results. Some bears may be more prone to passing mucous stools than others because of factors other than diet, such as differences in behavior, health or environment. Finally, there may not be one cause for the production of mucous stools that we can pinpoint. So, examining wild spectacled bears could be very beneficial. First, we need to determine if wild spectacled bears pass mucous stools. Then learning more about the diet, behavior, health risks and environmental pressures faced by wild bears may lead to finding a cause for mucous stools in spectacled bears. This information may also help identify factors responsible for mucous stool production in giant pandas.

References

- Dierenfeld, E.S. (1989). Nutritional considerations in feeding the captive spectacled bears. *Proceedings of the First International Symposium on the Spectacled Bear*. pp.114-130.
- Mainka, S.A., Zhao G.L., and Mao, L. (1989). Utilization of a bamboo, sugarcane, and gruel diet by two juvenile giant pandas (*Ailuropoda melanoleuca*). *Journal of Zoo Wildlife Medicine*, 20(1), 39-44.
- Schaller, G.B., Hu, J., Pan, W., and Zhu, J. (1985). *The giant pandas of Wolong*. Chicago: University of Chicago Press.
- Sheskin, D.J. (2000). *Parametric and nonparametric statistical procedures*. New York: Chapman & Hall/CRC.
- Siegel, S., and Castellan, N.J. (1988). *Nonparametric statistics for the behavioral sciences*. New York: McGraw-Hill.
- Zhang, Y.P., and Ryder, O.A. (1993). Mitochondrial DNA sequence evolution in the Arctoidea. *Proceedings of the National Academy Science. USA*. 90. 9557-9561.

REACTIONS

A Question and Answer Forum for the Zoo Professional on Crisis Management

*By William K. Baker, Jr., Curator
Panthera Research, Maumelle, AR*



Question

You have often written in the past about preparedness, could you expand on that and has your viewpoint changed?

Comments

I often hear from fellow professionals that their facilities are prepared for the unexpected. Yet, after a few minutes of conversation it can be ascertained that they might not be as prepared as they think they are. What I mean by this statement is that preparedness is subjective. Every person has a slightly different viewpoint in this regard. So, what one person believes to be prepared may not fit with accepted industry standards or my viewpoint, for example.

Taking this to the next step, a person can ask "Do you have an emergency plan for crisis events at your facility?" Usually the answer is "yes". I then inquire when was the last time it was reevaluated, does it cover all contingencies, and does it provide for a clear delineation of duties and lines of communication during a crisis? More often than I would like to hear, the answer isn't a resounding "yes" to all aspects of the question above.

The next step in the conversation is to ascertain how often the staff at an institution really devotes time and financial resources to actual training. When was the last time you had a dangerous animal escape drill, fire drill, or practiced for a medical emergency? How often does your firearms team go to the range, does your chemical anesthesia team practice regularly, and does your facility have a designated line item to support training and continuing education?

The good news is that most facilities do train and view their emergency responders as a valued asset to their institution's safety. However, how often they train is frequently where this breaks down. Many facilities only practice 1-4 times a year, while others practice on a monthly basis. My viewpoint tends to favor the monthly practice. Once again, it's subjective. While I tend to favor a more progressive stance on these issues, many individuals don't necessarily share my views and believes that less is better.

I was trained from an early age with the mindset and adage "Plan for the worst and hope for the best." In short, you're prepared, equipped, financed, and supported by your peers. Now I'll be the first to admit, if you are practicing every week, that's a bit much and falls into the "overkill" category. Conversely, one of my friends said to me years ago "That Murphy was an optimist". In closing, I would have to say no my views haven't changed over time. Just be grounded in your decision-

making process and realize that if you can consider a potential problem, then you may want to consider the impact on your staff and facility. A final thought, my compliments to the Audubon Zoo's "A-Team", the Downtown Aquariums "Red Team", the staff of Moody Gardens, and Houston Zoo's ERT. These storm riders exemplify the best traits of crisis managers and are a credit to our industry for staying in the paths of Hurricane Katrina and Hurricane Rita as the storms made landfall.

Question

I am planning on traveling internationally in the future and wanted to know about cell phone use abroad, especially considering all the terrorist activity lately. Do you have any advice?

Comments

Taking a cell phone abroad while traveling is a great idea. However, it's important to know the difference between the two main types of cell phones out there. The two types of cell phone networks are GSM and CDMA.

GSM stands for Global System for mobile Communications. It is used extensively in Europe where it's the standard. It is also used in Australia, Canada, Latin America, New Zealand, as well as Asia and the Middle East. As I understand it, it is also used in parts of the Caribbean as well. The two stateside providers are Cingular and T-Mobile.

CDMA stands for Code Division Multiple Access. It is used extensively in the United States, Canada, Mexico, and overseas in China, New Zealand, Taiwan, and South Korea. If I'm not mistaken it's also used in parts of the Caribbean and Latin America. The two main providers are Sprint® and Verizon®.

There is a third network called IDEN, which is available in the United States, Canada, Mexico, and Latin American. The provider is Nextel®.

It's extremely important that you check with your individual provider in advance of traveling, as not all cell phones work abroad and there is some model specifics to support international use. Also, not every carrier has roaming available for use in other countries and most important, you do want to know how much that roaming will cost you!

Next Month: With all of the advances in crisis management, why do escapes and emergencies still occur?

If you would like to submit a question for this column or have comments on previously published materials, please send them to AAZK, Inc., 3601 S.W. 29th St., Suite 133, Topeka, KS 66614 Attn: Reactions/AKF

(About the Author: Since 1985 Bill has been active in the fields of science, zoology, and wildlife management. His education and experience include a B.S. in wildlife management and post-graduate studies in zoology, Lab and Museum Assistant, Shoot Team Leader, ERT Member, Large Mammal Keeper, Senior Keeper, and Zoo Curator at various zoological facilities. His area of research is crisis management in zoological institutions, which draws upon practical experience and training as a Rescue Diver, Hunter Safety Instructor, NRA Firearms Instructor, and Red Cross CPR/First Aid Instructor.

Getting Everyone On Board!

The Shape of Enrichment and Pretoria Zoo's
Enrichment and Husbandry Training Workshops
May 23rd through June 10th, 2005

By

*Beth Hammond, Shape of Enrichment Workshop Coordinator & Trainer
San Diego, CA*

In October 2003, Valerie Hare from the Shape of Enrichment, Dr. Rob Young from PUC-Minas in Brazil and I presented an enrichment and husbandry-training workshop for the Johannesburg Zoo at the Rietvlei Zoo Farm in conjunction with the 6th International Conference on Environmental Enrichment hosted by the Johannesburg Zoo.

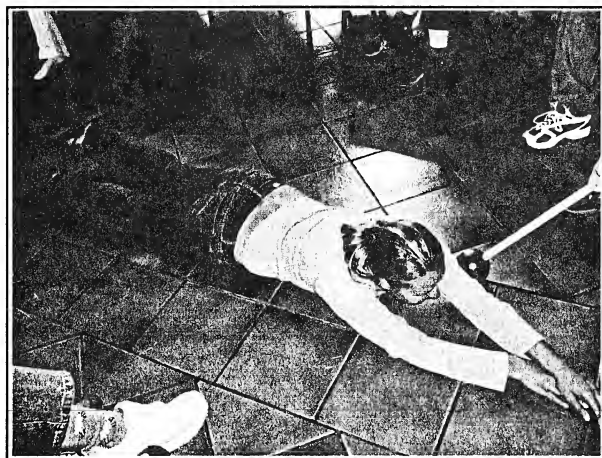
Subsequently, I was approached by Robynn Ingle, the enrichment coordinator for the National Zoological Gardens of South Africa, and asked if I would be willing to return to South Africa and conduct a set of workshops for the Pretoria Zoo, its breeding centers and allow outside institutions access to the workshops as well. During the planning of the workshop, I realized that it would be highly beneficial to have a team member with construction expertise and I asked Matthew Rich, an enrichment construction specialist from the San Diego Zoo, if he would be willing to help. After a long series of e-mails, SKYPE internet phone calls and changing the schedule too many times to count, I returned to South Africa to join Robynn in conducting six environmental enrichment and two husbandry training workshops, hosted by the National Zoological Gardens of South Africa.

The first two weeks of the three weeks of workshops were held at the Pretoria Zoo. On Monday and Tuesday, we conducted workshops for Pretoria staff only. Wednesday and Thursday were open to outside institutions but priority was given to Pretoria Zoo staff. Monday and Wednesday were mostly in class activities that highlighted the importance of enrichment, enrichment theory, safety practices, documentation, animal welfare standards and enclosure design. Tuesday and Thursday were the fun practical sessions! In the evenings we held informal options sessions. Wednesday was Video Night, where I showed videos from the Shape of Enrichment Video Library (A perk of being the video librarian for North America!). Thursday was behavioral data collection where we did pre- and post-enrichment observations and data collection on mice. Friday was the husbandry-training day and was an open session. The last week, we spent two days at each of the National Zoological Gardens off-site breeding centers; Mokopane and Emerald Animal World where we conducted scaled down versions of the formal workshops with a greater focus on practical sessions.

Workshop participants do pre- and post-enrichment observations and data collection on mice



I taught the two all-day training workshops at the Pretoria Zoo on May 27th and June 1st. These two workshops were full of activities to help all animal care staff understand they can use positive reinforcement to train behaviors that decrease animal stress, increase keeper safety and improve animal husbandry. We also discussed the idea that we are training our animals everyday, but we may not realize it. We asked them to think carefully about how and when they react to their animals and how that could be either positively or negatively reinforcing behaviors. We also played the training game and made sure that everyone was an animal and a trainer. Then, they got to practice what they had learned on goats and pigs housed in the Farm Yard at the zoo. Training theory was also incorporated into the workshops at Mokopane and Emerald Animal World.



Playing the "Training Game"

We had several goals for this workshop, but the most important goal was to increase staff motivation to continue with enrichment by increasing their understanding of animals' natural history thereby increasing empathy for the animals in the zoo staff. We wanted to do some activities that really put the keepers "in the animals' shoes", as it were. We created an activity for the first day where we put all the participants in an enclosure that was built in the 1910's. We acquired a box of apples and then rounded up a

group of school children to "feed the animals." It was great! Lots of poking, laughing and general fun! We then served the rest of lunch inside the old enclosure as well. We purposely had no tables or chairs so we had to sit on the hard floor of the enclosure. The third time we did this activity, I noticed something about how I was feeling. I was eating very quickly, I was very vigilant of what was going on around me and I was not enjoying my food very much. I ask the rest of the participants how eating their lunch this way made them feel, they had similar observations to share. Then I asked them how this might make a prey animal feel; having to eat in such an exposed manner, without it's natural surroundings. Many people answered with the same kinds of feelings we were having and I saw a lot of people make the connection.

Another moment where we knew we were on the right track was after a huge enrichment session in the Kodiak bear enclosure. Once the 0.2 bears were shifted into their night rooms, 30 of us entered the exhibit and I watched the creativity flow! We smeared salad dressing,



South African school children "feed the animals"

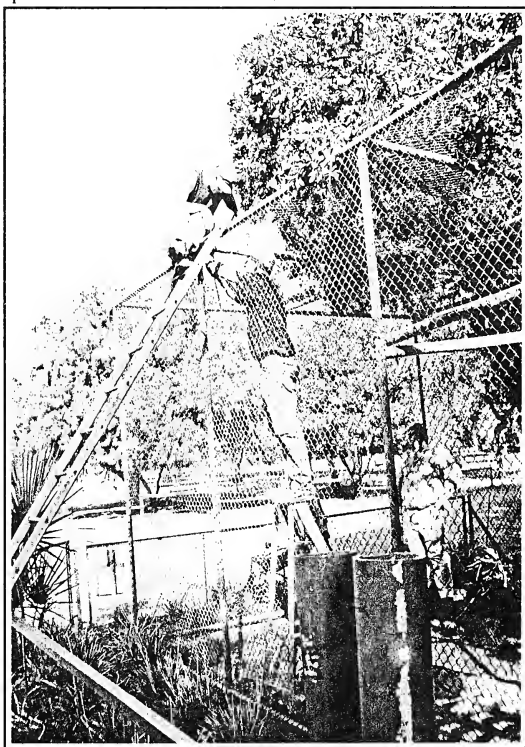
ketchup, Oxite (which is something reminiscent of Vegemite but nastier!), peanut butter and human scent across the exhibit. We hid food items under pinecones, under logs, in trees and in toys. And we put out piles of leaves and fresh dirt for exploring. When the bears were let out, we could see



A bear reacts to scents and other enrichment

their noses working intensely to try and figure out what had just gone on in their home. They bypassed most of the food items and immediately stated sniffing, rubbing and rolling in the salad dressing and ketchup. We watched the bears interact with the enrichment for about 30 minutes but needed to press on since we had other animals to enrich, but no one wanted to go. We videotaped the session and when we reviewed it later with the staff, we asked them how it made them feel. Sunnyboy Madumo an animal attendant replied, "It made me feel very proud!"

It was not only animal attendants and keepers who attended our workshops. At Mokopane, we had the "Friends of the Mokopane Zoo" come and help during the practical sessions. Mokopane had a 9-month-old Bengal tiger that was confiscated by Wildlife Conservation and was being temporarily housed in an approximately 4 meter wide x 7 meter long x 5 meter high enclosure that was built in the early 1980's. With the help of the Mokopane volunteers and staff, we installed a fire hose hammock, chipped out a brick from the enclosure's footing to drain off standing water, added at least 5 wheelbarrows full of fresh sand, made an elevated bed, offered some dried reeds on his bed and to play with (which he LOVED) and hung a tire on a bungee cord mechanism. We started working on the enclosure just after lunch and finished around 4:30pm. When we let the tiger back out, he immediately started playing with the tire. He pounced on it, batted it around and lay on his side while he grasped it with his front paws and tried to disembowel it with his back feet! When we went back to check on him around 6:30pm, he was still playing with the tire. And when we checked on him at 7:00am the next morning, he was still playing with it! The animal care staff was impressed but a special thanks has to go out to the volunteers and in particular to Helga Heinberg, who has stepped up to be Mokopane's Enrichment Coordinator. With her enthusiasm we know the animals at Mokopane will continue to have highly enriched lives.



Volunteers revamp Bengal tiger exhibit

In the end, we had 215 attendees: 151 from the Pretoria Zoo, Mokopane & Emerald, 12 interns in a zoo-keeping program and 52 from outside institutions including the Johannesburg Zoo, uShaka Marine World in Durban, Bay World in Port Elizabeth, Cango Wildlife Ranch, Lory Park Zoo and Owl Sanctuary and the University of Pretoria Biomedical Research Center. We had a wide variety of animal care professionals: aquarists, laboratory animal care staff, game managers, marine mammal trainers and traditional zookeepers.

Ultimately, I felt the workshops were successful. The Director of the National Zoological Gardens, Mr. Labuschagne, was so impressed, he's asked me to conduct another workshop for the International Zoo Educators Conference to be held at the Pretoria Zoo in September 2006.

It was an amazing trip that will stay with me for a lifetime. I could never have done it without the help and dedication of several people: Carin Cloete, curator of carnivores, primates and the nursery at the Pretoria Zoo; Graeme Ogilvy, animal attendant at the Pretoria Zoo, incredible helper and braai chef extraordinaire; Wimpie Swan, conservator at the Pretoria Zoo; Mark Howitt, General Manager of Mokopane, whose wealth of general knowledge was most impressive; Sophie, our intern volunteering from Germany and another all around incredible helper; Matthew Rich, enrichment construction specialist without whom the tiger would not have gotten his hammock installed, his enclosure drained or his tire hung up; and, of course, Robynn Ingle-Moller, Enrichment Coordinator for the National Zoological Gardens of South Africa. Her enthusiasm, skills and dedication made this workshop possible.

Lastly, I want to thank Val Hare at the Shape of Enrichment and Dr. Nancy Gamble for their financial support to make this dream a reality.

If your institution would be interested in an enrichment/husbandry training workshop, Shape of Enrichment would like to help! Please contact Beth Hammond, zoobeth26@cox.net or 619-527-2820 for more information. We will work with you to modify our curriculum to best meet your needs. The Shape of Enrichment is a private non-profit educational organization dedicated to encouraging enrichment worldwide.

Three AAZK Animal Data Transfer Forms Now Available Online !!

The American Association of Zoo Keepers, Inc. encourages all zoos and other animal care facilities to utilize the following data transfer forms whenever they are shipping an animal between facilities. Providing this information to the receiving facility will ease the transition of a new animal into the collection and provide vital information to receiving staff. With the greater emphasis on enrichment and training at all AZA-accredited facilities, this information will prove especially important in providing continuity and consistency when an animal is shipped.

All three forms are now available in downloadable pdf format at www.aazk.org

All collection managers are asked to include all three of the forms where applicable whenever an animal is shipped. THREE copies of each form should be sent with the animal being shipped. At the receiving institution these copies should be distributed to the following staff: **a) Curator b) Keeper** who will be caring for the animal and **c) Zoo files and/or veterinarian**

1. The original **Animal Data Transfer Form** provides information on the animal, its diet, reproductive history, medical and physical husbandry information, etc. This form is one page in length.
2. The **Enrichment Data Transfer Form** provides information on the animal's behavioral history, and data on what types of enrichment have been utilized and their success or failure with the particular animal. This form is two pages in length.
3. The **Operant Conditioning Data Transfer Form** provides background information on any training that has occurred with the animal, training schedules, types of training, animal's reaction to training, etc. This form is two pages in length.

We all seek to provide the best and most professional care possible for the animals in our collections. Using the three AAZK data transfer forms will help provide receiving institution staff with the tools to make this possible. Your cooperation and participation is encouraged and appreciated. These forms are provided as a professional courtesy by AAZK, Inc.

Legislative/Conservation Update

Compiled by Georgann Johnston
Legislative Advisor
Sacramento, CA



House Passed Overhaul of Endangered Species Act

In late September 2005 the House of Representatives passed the most sweeping overhaul of the Endangered Species Act (ESA) since the landmark bill was born 32 years ago. The vote was 229 for and 193 against. The bill is commonly being referred to as the "Threatened and Endangered Species Recovery Act."

One primary change would be to replace the "critical habitat" provisions of the ESA with something more narrowly focused. It would give property owners a greater say in developing a species recovery plan and restricts the kind of information scientists can present when seeking to protect plants and animals. It also has a provision to pay property owners when their plans are thwarted by species protection. Additionally, for the first time, it would reduce protections for "threatened" species compared to "endangered" species.

Proponents of the bill say that this country has always stood for the proposition that when the government takes property the landowner should be fairly compensated. They say this new bill would be in accordance with those principles. Opponents, on the other hand, say that the bill undercuts important environmental protections. Both sides agree that the proposed changes would be costly. The federal government spends about \$379 million annually on endangered species activities. The new bill could boost this to over \$600 million annually because of modified agency rules, and new planning deadlines. Higher costs would also come from having to pay fair-market value to landowners with frustrated development plans.

Concerns about the property owner compensation provisions have been raised by Republicans and Democrats alike. The Bush administration formally supported the bill prior to its passage by the House, but raised a red flag about "significant budgetary impact" once it cleared that branch of Congress. *Source: Sacramento Bee Newspaper 30 September 2005*

Giant Squid Captured on Film

The giant squid (*Architeuthis dux*) have been the subject of legends, stories, and even part of Jules Verne's *20,000 Leagues Under the Sea*. Now, researchers from Japan have filmed a 26-foot long squid in its natural habitat 3,000 feet below the ocean's surface. Researchers from Japan's National Science Museum baited a line with large shrimp and trawled for the purplish-red sea monster. Prior to this encounter, giant squid had never been seen other than washed ashore dead or dying or caught in fishing nets. This squid was found about 600 miles southeast of Tokyo.

Giant squid are the world's largest invertebrates, having been known to exceed 50 feet. The Japanese team, capping a three-year effort, filmed the squid attacking the bait and struggling for a number of hours to get free of the hook. The photos were well-received by researchers around the world because of the difficulty of finding the mysterious giant. "That's getting footage of a real sea monster," said Randy Kochevar, a deep-sea biologist with the Monterey Bay Aquarium in California. "Nobody has been able to observe a large giant squid where it lives. There are people who said it would never be done. It's really an incredible accomplishment."

The photos – taken with strobe lights at 30-second intervals – also shed some new light on the animal's behavior. It appears that the squid is a much more aggressive predator than previously believed. In the pictures the squid's tentacles can be seen stretching out toward the bait, grasping it

and pulling away in a ball. It is then seen struggling to get itself free of the jig attached to the line under the remote-controlled cameras. *Source: Wall Street Journal 28 September 2005*

Import/Export of Beluga Caviar Imposed by USFWS

The U.S. Fish and Wildlife Service has suspended import and re-export of threatened beluga sturgeon (*Huso huso*) caviar and meat originating in the Caspian Sea basin countries, effective 30 September 2005. Countries covered by the suspension include Azerbaijan, the Islamic Republic of Iran, Kazakhstan, the Russian Federation, and Turkmenistan.

The Service listed all beluga sturgeon populations as threatened under the Endangered Species Act effective 21 October 2004. To provide economic incentives for conservation efforts by Caspian Sea and Black Sea countries harvesting beluga sturgeon, the Service issued a special rule on 4 March 2005, setting certain conditions for exempting foreign and U.S. domestic commerce in beluga sturgeon products from the Act's permit requirements. The terms of the special rule parallel recent decisions on beluga sturgeon and other sturgeon species under the Convention on International Trade in Endangered Species (CITES).

The special rule required Caspian Sea countries wishing to continue to export beluga sturgeon caviar and meat to the United States under this exemption to submit, by 6 September 2005, copies of their laws and management plans for the protection and conservation of the species. To date, the Service has not received any of the needed information from these countries. As a result, beluga sturgeon caviar (including products containing caviar, such as cosmetics) and meat from the Caspian Sea basin are no longer eligible for the exemption provided by the special rule. The trade suspension can be lifted if Caspian Sea countries submit the information required under the special rule.

The suspension applies not only to commercial shipments that have been exported directly from Caspian Sea countries or re-exported through an intermediary country, but also to "personal effects" originating in Caspian Sea countries. Until this rule was put in place, international travelers either entering or leaving the United States could legally carry up to 250 grams of beluga sturgeon caviar for personal use without permits. However, imports of personal effects will no longer be allowed for beluga caviar from Caspian Sea countries. The action does not apply to caviar and meat from other sturgeon species such as ossetra, sevruga and domestic white sturgeon caviar. *Source: USFWS Press Release 29 September 2005*

Habitat Conservation Plan for Migratory Birds

Interior Secretary Gale Norton recently announced the Migratory Bird Conservation Commission has approved nearly \$29 million for habitat conservation in the United States and Canada to benefit migratory birds. At the same time, the Commission also approved the acquisition of nearly 6,000 acres of important migratory bird habitat to be added to the National Wildlife Refuge System.

The Commission's action will fund grants to states and other partners through the North American Wetlands Conservation Act (NAWCA) to meet important habitat goals for migratory birds. The Commission also allocated revenue from the sale of the Migratory Bird Hunting and Conservation Stamp, the Duck Stamp, to purchase key tracts of land for the Service's National Wildlife Refuge System in Louisiana, Texas and Mississippi.

The NAWCA Standard Grants Program funded 25 projects with more than \$24 million in 19 States to protect, restore or enhance more than 198,000 acres of wetlands and associated upland habitats in the United States. Project partners added nearly \$97 million. "Acre-by-acre, public and private partners are restoring wetlands across the nation," said Secretary Norton, who chairs the Commission. "Wetlands provide excellent habitat for wildlife and provide millions of Americans with a broad range of outdoor recreational opportunities."

Since 1990, more than 2,800 partners have been involved in more than 1,900 Act-supported projects in the United States, Canada, and Mexico. Partners must at least match the grant request dollar for dollar. Canadian and U.S. partners focus on long-term protection, restoration, or enhancement of critical habitats; Mexican partners also may develop training, management, and environmental education programs and conduct studies on sustainable use. In total, nearly \$700 million in Act grants have been invested in the three countries. Partner contributions have amounted to \$2.0 billion. Some 14 million acres of wetlands and associated uplands have been affected. *Source: USFWS Press Release 29 September 2005*

Recreational Use of Wildlife Refuges Generates \$1.4 Billion in Revenue

A report released in early October 2005 by the Department of the Interior shows recreational use on national wildlife refuges generated almost \$1.4 billion in total economic activity during the 2004 fiscal year. The report, *Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*, was compiled by U.S. Fish and Wildlife Service economists.

According to the study, nearly 37 million people visited national wildlife refuges in 2004, creating almost 24,000 private sector jobs and producing about \$454 million in employment income. Additionally, recreational spending on refuges generated nearly \$151 million in tax revenue at the local, county, state and federal level. More than 80% of retail sales came from people who traveled some distance to get to national wildlife refuges and the recreational opportunities they offer. Local residents accounted for just 17 percent of total retail sales to refuge visitors.

"Our national wildlife refuges are not only beautiful places where fish and wildlife can flourish, they are also economic engines for their local communities, providing jobs, customers for local businesses, and tax revenue for local governments," Interior Secretary Norton said. "With 17 new refuges and a 30% increase in the refuge system budget since 2001, we are ensuring our refuges continue to be places of awe and wonder as well as economic vitality for local communities across the country."

The report reinforces the travel industry's belief that ecotourism is becoming big business, according to Roger Dow, president of the Travel Industry Association of America, who unveiled the report with the Secretary of the Interior. The study measured the economic impact of ecotourism, large numbers of people traveling substantial distances for outdoor activities like wildlife observation and photography, as well as more traditional refuge programs like hunting and fishing.

The Southeast led the Refuge System in economic impact. With nearly 11 million visitors last year, national wildlife refuges in the Southeast created more than \$451 million in economic activity and more than 8,500 jobs.

Using findings from 93 national wildlife refuges considered typical in terms of the nation's recreational interests and spending habits, the report analyzed recreational participation in and expenditures for freshwater fishing, saltwater fishing, migratory bird hunting, small game hunting, big game hunting and non-consumptive activities, including wildlife observation. Costs considered in the calculation of the total economic activity included money spent for food and refreshments, lodging at motels, cabins, lodges or campgrounds, and transportation.

In making its calculations, *Banking on Nature 2004* used the Fish and Wildlife Service's "2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation" and the visitation numbers from Refuge Management Information System. Refuges with fewer than 1,500 visitors per year and those in Hawaii and Alaska (because travel there is so expensive) were excluded from the final calculations. *Source: USFWS Press Release 5 October 2005*

Smuggled Orangutans Found

Two animal parks in Peninsular Malaysia have been found to possess Sumatran orangutans (*Pongo abelii*) smuggled from Indonesia, and have broken wildlife protection laws. DNA tests showed the seven orangutans taken from two locations are of the "critically endangered" Sumatran sub-species, said the Wildlife and National Parks Department (Perhilitan). Another 46 captive orangutans are of the Bornean species. Whether these were legally procured remains unclear. Trade and possession of these animals are strictly regulated under international and local laws.

Earlier this year, complaints that Sumatran orangutans were being forced to perform for park visitors forced Perhilitan to investigate how the primates were obtained. "Perhilitan felt obliged to handle the complaints transparently and professionally. That's why it was decided to conduct DNA tests on captive orangutans in Peninsular Malaysia," said law and enforcement director Mislihah Mohamed Basir.

It tested the DNA of 58 orangutans known to be held in captivity in seven zoos and private parks in Peninsular Malaysia. These are the Air Kroh Zoo and the A Famosa Resort in Malacca, Zoo Negara in Kuala Lumpur, the Taiping Zoo and Bukit Merah Laketown Resort in Perak and TC Arapaima and Johor Zoo in Johor. The last of the results were received on Sept 12. Five are Sumatran orangutans that were legally procured before 1975, when international wildlife protection laws came into force, she said.

The seven smuggled Sumatran orangutans were seized when Perhilitan discovered the owners had no documents. (Source: [http://www.nst.com.through ZooNews Digest No 370 3-10 October 2005](http://www.nst.com.through/ZooNews/Digest_No370_3-10October2005))

IZC Registration Now Open !

The registrations for the 2nd International Congress on Zookeeping 7- 11 May 2006 on the Gold Coast Australia have now opened!

Thanks to some very supportive sponsors registration costs for **"early bird" full registration** are \$450 Australian dollars. Based on today's exchange rates this works out approximately \$US338 or Euro 279. Accommodation is additional to this and we have secured a good rate at the conference hotel - the Gold Coast International. Triple share for 4 nights works out at \$280 Australian dollars or approximately \$US210 or Euro 174 which includes a buffet breakfast.

The full conference registration will cover all events which include icebreaker Sunday night, Dreamworld dinner Monday night, breakfast at Currumbin Sanctuary Tuesday morning, BBQ dinner Tuesday night and the conference dinner at Seaworld Wednesday night. All functions include food and some drinks. Morning, afternoon tea & lunch will be supplied each day Monday to Thursday.

Accommodation is limited so it important that people register early for the conference. **The "early bird" conference rate ends 28 February 2006** after which full registrations rise to \$AUD550.

We are offering a number of pre- and post -onference tours which include to Australia Zoo, Koala habitat field work, North Queensland, Fraser Island and O'Reilley's Rainforest Retreat. All information on these tours is available in the conference registration information on the ICZ website.

Registration information, registration forms and accommodation booking forms are all available on the ICZ website - <http://www.iczoo.org/>

If you require any further information feel free to email me - slromer@bigpond.com

Looking forward to seeing you there!

Liz Romer
ICZ Conference Convener

Second International Congress on Zookeeping

Here's another reminder to mark your calendar for May 7-11, 2006!

SPONSORS NEEDED!

Those of you who participated in the first ICZ last year in The Netherlands know what an amazing experience it was, and we hope you will plan to attend the next one on Australia's Gold Coast. What you may not know is that generous donations from various AAZK Chapters greatly reduced the final cost of attending the conference. In the end, the total cost per participant was just \$350, which included registration, lodging, and most meals. We reached this affordable price thanks to donations from local AAZK Chapters and the various international professional keeper associations.

In some cases, local AAZK Chapters banded together to completely fund keepers from developing countries who would otherwise be unable to attend. These Chapters pooled their resources to pay airfare and registration costs for individuals from Latin America and other areas. We intend to continue this generous tradition, and hope your AAZK Chapter will consider sponsoring a keeper from another country **We currently have identified keepers from Columbia, Papua New Guinea and India to attend.** Start planning an ICZ fundraiser now. If you prefer, you can simply donate to the general operating costs of the conference in order to reduce the overall registration cost for all participants. Your donation can really make a difference to keepers (and animals!) in parts of the world without access to our resources. Please send your designated ICZ donations to: AAZK, Inc., 3601 S.W. 29th St., Ste. 133, Topeka, KS 66614-2054. Any questions? Contact Shane Good: sjg@clevelandmetroparks.com or Norah Farnham: Norah.Farnham@zoo.org

NEW ICZ LOGO NEEDED!

The International Congress of Zookeepers (ICZ) is seeking a new logo. This logo will be used on all ICZ-related items such as letterhead, T-shirts and conference satchels, as well as the website and all future merchandise marketed by the ICZ. To submit a logo for consideration, please follow these guidelines:

- must incorporate the letters "ICZ" in the design
- should be easily reproducible
- should represent zookeeping on a global level
- preferably limit to 2 colors; if you choose to include color send both a color and a black and white version

If you would like to have your design considered as the new logo, please send a **high resolution** .jpg file to: Norah.Farnham@zoo.org Or you may send a hard copy to: Norah Farnham, c/o Woodland Park Zoo, 601 N. 59th St., Seattle, WA 98103 USA.

Entries are **due by January 30, 2006**. The Steering Committee of the ICZ will narrow the entries to (5) finalists who will be notified by April 1, 2006 that their design is to appear on the 'ballot' at the congress in Australia. The winning logo will be voted on by the delegates and announced at that time.

Change of Contact Information:

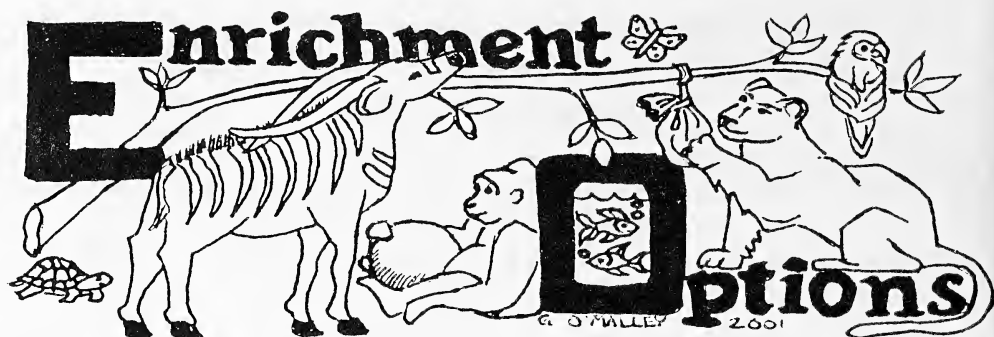
Second International Congress of Zookeeping (ICZ)

For more information, please visit <http://www.iczoo.org> or

send a blank e-mail to ICZ_News-subscribe@yahoogroups.com for regular updates on this event

or contact Liz Romer at slromer@bigpond.com

Mission Statement: *"The ICZ (International Congress of Zookeeping) will build a worldwide network among zookeepers and other professionals in the field of wildlife care and conservation. This exchange of experience and knowledge will improve the professionalism of zookeepers for the benefit of the animals under their care and promote awareness and actions that will contribute to the preservation of wildlife everywhere".*



*EO Editors - Dawn Neptune, Utah's Hogle Zoo
and Rachel Cantrell, Disney's Animal Kingdom*

Evaluation of Environmental Enrichment in Zoos

By M. Katherine Roberts, M.S.

Franklin Park Zoo and Tufts University Center for Animals, Boston, MA

Over the past 20 years zookeepers have been making a concerted effort to increase the quality of life for the animals in their care. Along with higher standards for husbandry and veterinary care, zookeepers have become more knowledgeable about behavioral conditioning and environmental enrichment options. In scanning the professional journals, one often finds listings of various conferences and forums on these subjects. To date, there have been seven international conferences, the most recent in August of 2005. The proceedings of these conferences have successfully allowed zoo professionals to share ideas and options for environmental enrichment for various taxa. Although zoo keepers have made great strides in determining enrichment options, little progress has been made when it comes to evaluating the success of enrichment.

In May of 1994, the American Association of Zoo Keepers, Inc. (AAZK) established an Enrichment Committee. Among the goals of this committee were to assist institutions in establishing their own enrichment committees, and providing a network for professionals to share information regarding enrichment (AAZK, 1994). While most institutions have established an enrichment program, few had provided for evaluation of the enrichment. It was assumed that if the individual interacted with the item, it was considered successful. It was not until the following year that the AAZK Enrichment Committee determined that "proper documentation of animal enrichment was as equally important as the enrichment itself," (AAZK, 1995).

Mellen and Sevenich have suggested a standardized format that has been utilized at the Disney's Animal Kingdom (DAK), (1997). The DAK system consists of two components, observed interactions, and inferred interactions. The observed scale ranks interactions on a 1 (animal flees from object) to a 5 (animal interacts with objects for more than 10 minutes). The inferred interactions require a description of what was found. Many new programs adapted this formula to evaluate their enrichment, using fewer numbers in both categories, or only using the direct observation scale portion of the evaluation. Other institutions use institution-specific forms in order to record behaviors

observed based upon the natural range of behaviors of a particular species. Prior to the approval of an item's use, some forms request information about what behaviors will be influenced; decrease of abnormal behaviors, mental/physical stimulation, and stress reduction. The goal is then to evaluate whether or not those behaviors have been affected by the presence of an item. However, few papers have documented how institutions do this (Ross, 1999; Hawkins, 1999; Oliva-Purdy, 1997; Stark, 2000) and few scientific studies have been conducted to evaluate the evaluation of enrichment. This project gathered information from institutions with active enrichment programs regarding evaluation of environmental enrichment and determined if correlations exist between the management of the program and the longevity of the programs.

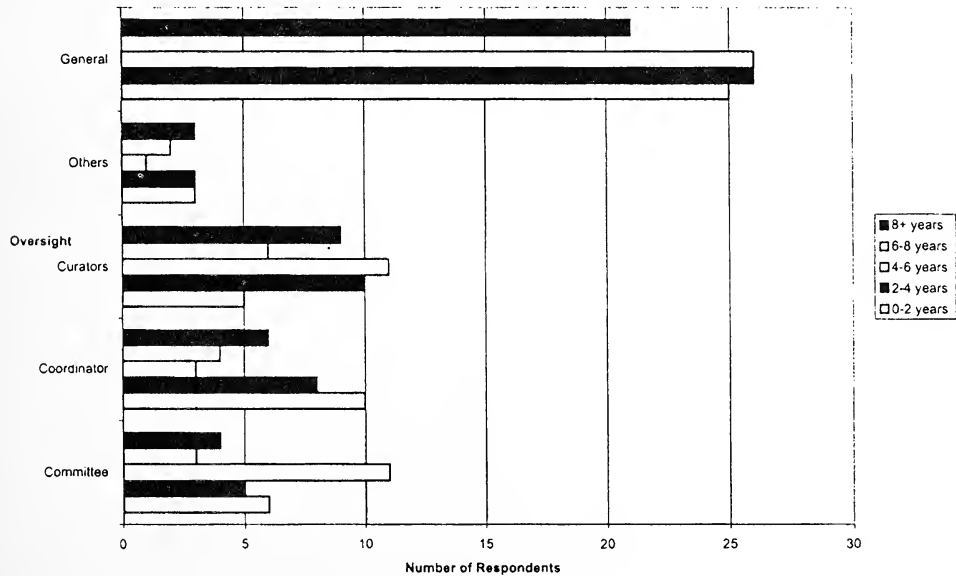
To gather the information for this project, a mail survey was conducted. With the assistance of the AAZK Enrichment Committee, a list of zoological institutions with formalized enrichment programs was generated. In all, 216 institutions were contacted to participate. There was such an overwhelming response with additional information, it was decided that for this project that only institutions with terrestrial mammals would be cataloged. While there were various confounding factors in effect when attempting to classify non-respondents, the overall response rate was 61%.

Program Oversight

For respondents with active enrichment programs, the majority of programs were overseen by curators (33%), enrichment coordinators (25%), and enrichment committees (21%). Enrichment coordinators are often experienced keepers, former keepers, or individuals who specifically oversee enrichment programs. For institutions with committees, respondents were asked to detail the members of their committees; keepers, veterinarians, curators, directors, education specialists, and other animal managers were the common constituents of enrichment committees.

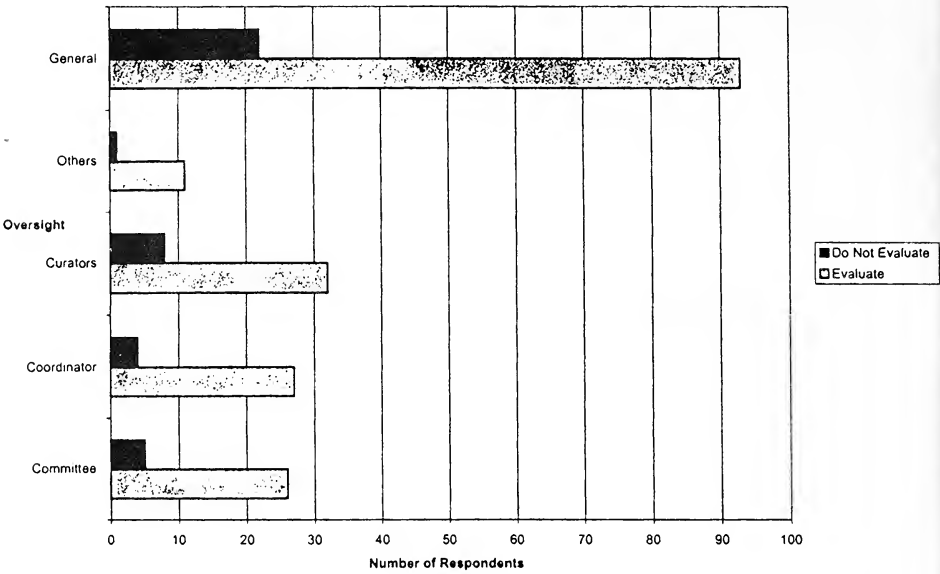
Longevity of Program

Table 1: Oversight and Longevity



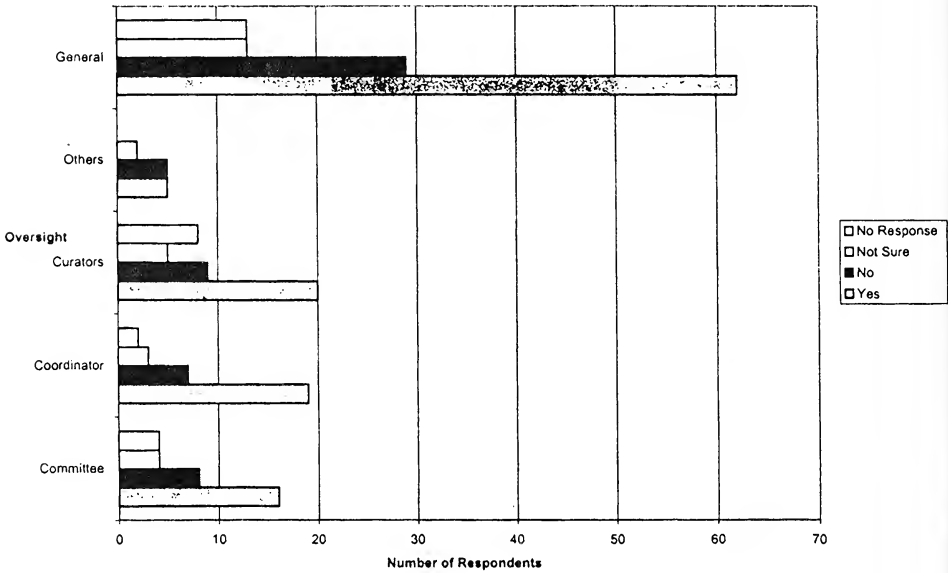
As seen in Table 1, enrichment programs overseen by curators and committees tend to be "middle aged." However, younger programs had coordinators to help organize the program. The older programs (8+ years) operated under the supervision of curators.

Table 2: Oversight and Evaluation



Positively, as seen in Table 2, the majority of respondents did evaluate the enrichment that they provided. This demonstrates that many enrichment programs have moved past just offering enrichment to the next step; evaluating the success or failure of the enrichment.

Table 3: Oversight and Evaluation Accuracy



Evaluation Accuracy

Table 3 demonstrates that the majority of respondents have confidence in the methods that they use to evaluate the enrichment that they provide. The interesting piece of information that results from this analysis is that for those that are confident in their evaluations, almost half that number do not feel that their evaluation methods are appropriate and need more development. Even more interesting is that one-fourth of the respondents in each group are not sure if they are satisfied with their evaluation methods.

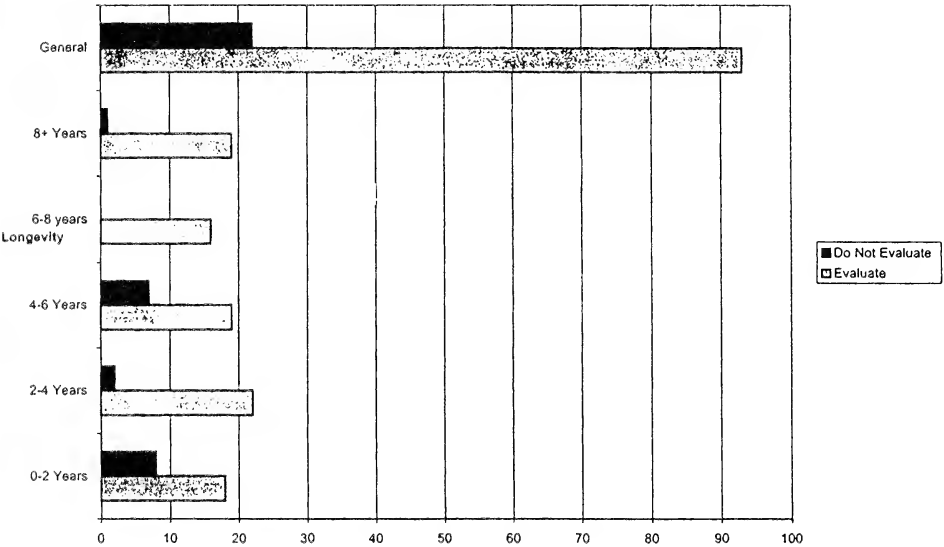
Program Longevity

Respondents were separated into five groups depending upon how long they have been in existence, 0-2, 2-4, 4-6, 6-8 and 8+ years. The general respondents were again included as a baseline. While each category was compared with the same factors in mind, the results for respondents in both categories were similar.

Evaluation of Enrichment

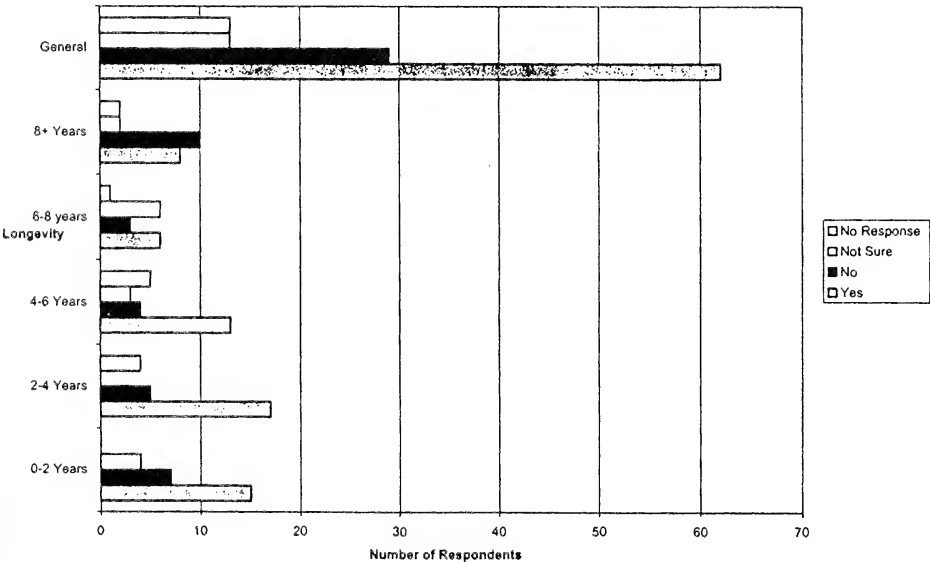
When examining the occurrence of evaluation based upon the longevity of the program, it was found that older programs were more likely to evaluate the enrichment that was provided. One reason for this may be that experience pays off. Older committees benefit from the knowledge that more experienced keepers bring to the table. These results are shown in Table 5.

Table 5: Longevity and Evaluation



Evaluation Accuracy

Table 6: Longevity and Evaluation Accuracy



With one exception, the oldest group, most groups felt that their evaluation methods were capable of assessing the value of the enrichment for their animals. Enrichment programs that have existed for eight years or more were more likely to have doubts about how adequate their methods were.

Enrichment is happening in zoos, which is an encouraging fact. It means that keepers have realized that often there are factors that are lacking for animals in captivity, and are trying to rectify this. Keepers are documenting enrichment and are attempting to evaluate it, but it appears that there are issues that need to be clarified to provide a way for all in the zoo field to benefit from this information.

Record Keeping

The results show that institutions involved in an enrichment program do maintain records. The United States Department of Agriculture requires that records must be maintained for non-human primates, so it would be a logical conclusion that institutions that enrich non-human primates might do so for the other animals in their collections and maintain records as well. An overwhelming majority of participants do keep records, no standard of record keeping has been put forth, but logbooks and calendars are most common among all respondents. Both forms offer convenience, as many keepers record animal updates in daily logbooks and calendars can be posted in holding areas to provide a spot to quickly jot down the information. Some respondents noted that they are in the process of utilizing computers to store the information for analysis, and pilot programs are underway allowing keepers to enter records on wireless communication devices. While time is precious for all, any method that is conducive to data recording for keepers at the time enrichment is presented will be beneficial.

Evaluation Accuracy

It is also encouraging that an overwhelming majority of institutions do evaluate the enrichment provided to their collections. Overall it does appear that the rating scale form of evaluation is most popular (53%), but the smaller categories tended to depend upon observation and discussion as the main technique. While observation is an important part of evaluation, it is not in itself "evaluation". In order to scientifically categorize responses, data should be collected on the preferences of the animals involved.

Participants were generally supportive of their evaluation methods. Programs supervised by the "others," were equally divided on whether or not their observation methods were accurate. The curatorial group was difficult to classify, as there were a large number of non-respondents to this question. Otherwise, they also supported their observation techniques. The two oldest groups in the survey were doubtful of their observation techniques. The 8+ group had doubts about their methods, while the 6-8 year-old programs split between supporting their methods and being unsure about the accuracy. Only two of the analyzed groups utilized the rating scale prominently - the coordinators and the 2-4 year-old group. All others favored various methods of observation such as time budgets, behavioral profiles, and simply watching the animals with the enrichment objects.

When the general participants were asked what suggestions they would make to improve their programs, 32% stated that they would prefer a more formalized method for evaluation and 14% said clarification of evaluation methods; 11% of respondents stated that they would like to see a more scientific approach to evaluation. While being familiar with the natural behaviors of a species is a good start, there is a grey area in evaluation, the observer's bias. As humans we often insert our interpretations of an animal's mental status into the equation, and thus are not always able to separate the true reaction from what we perceive as the reaction. As with welfare, there is not yet a way to truly determine the impact of enrichment on an animal. One suggestion would be to compare time budgets of confined animals with those of wild individuals (Veasey, 1996). However, since animals in the wild may rarely come across a bucket style puzzle feeder, comparisons are difficult if not impossible.

A positive fact is that a significant number of participants are not confident in the accuracy of their evaluations. For groups that have been in existence for more than 8 years, 46% stated that they do not feel that their methods are effective. For programs in existence for 6-8 years, 38% stated that they were unsure about their methods. This may signify that older programs are becoming more critical of the standards that were always held as law, and if they are concerned enough, they may be just the group to lead the charge into a new era of enrichment.

These results demonstrate that there is room for a more structured and uniform evaluation process. Beginning with the basics, definitions of positive and negative responses need to be established so that evaluators have a clear understanding of what they are witnessing when the animals interact with the objects. AZA's Behavioral Advisory Group has established a website for ethograms, (www.ethograms.org) and they are important tools that should be made readily available to keepers as a reference. When provided with the proper equipment, keepers will be able to make clear evaluations. The next step would be to establish a uniform method of evaluation. In the zoo field there are many standardized methods of record keeping, enrichment evaluation should be one as well. While it would require a great deal of inter-institutional communications, animal care teams would benefit from making this a priority. Institutions would benefit internally as they would be provided with a great deal of information regarding the behavior of the animals in their collections. This data would provide an objective base for scientific exploration in the field of captive animal behavior. This information would also include statistics that will inform them whether or not they have been successful in fulfilling the animals' basic needs.

Zoo keepers and other personnel have made great strides in enriching the animals in their care. However, it is obvious that while evaluation methods are in place, experienced members in the field state that they are lacking an objective standard. It is hoped that these experienced members will investigate the possibilities for a standardized format to assist in evaluation. Situations that allow for the sharing and communication of ideas and techniques will continue to advance the field of zoo animal husbandry, and will benefit both the animals and the people who come to see them.

References

- American Association of Zoo Keepers, Inc. 1994. Environmental Enrichment Workshop. *21st American Association of Zoo Keepers National Conference Proceedings*. 1994:143-146.
- 1995. Environmental Enrichment Workshop. *22nd American Association of Zoo Keepers National Conference Proceedings*. 1995:189-191.
- Hawkins, M.R. 1999. Practical Evaluation of Enrichment: A Scoring Method Designed to Include the Stimulation of Natural Behavior in the Success Method. *Proceedings of the Fourth International Conference on Environmental Enrichment*. 1999:22-32.
- Mellen, J. and Sevenich, M. 1997. The Science of Animal Management: Evaluating the Effects of Training and Enrichment on Animal Behavior. *Proceedings of the Third International Conference on Environmental Enrichment*. 1997:162-166.
- Oliva-Purdy, J. 1997. Enrichment Assessment in the Time You Don't Have: Don't Panic! *Proceedings of the Third International Conference on Environmental Enrichment*. 1997: 61-74.
- Ross, J. 1999. From Art to Science: Documenting the Effectiveness of Enrichment and Training. *26th American Association of Zoo Keepers National Conference Proceedings*. 1999:76-82.
- Stark, B. 2000. Is it Really Enrichment...How Can You Tell? Documenting and Evaluating Enrichment Efforts. *27th American Association of Zoo Keepers National Conference Proceedings*. 2000:250-258.

Ideas appearing in this column have not necessarily been tested by the editors for safety considerations. Always think ahead and use good judgement when trying new ideas. You are invited to submit material for the Enrichment Options Column. Look in the January 2004 issue of AKF for guidelines for articles acceptable for this column's format or contact the editor at akfeditor@zk.kscoxmail.com for a copy of the guidelines. Drawings and photos of enrichment are encouraged. Send to: AKF/Enrichment, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054, USA. Eds.)

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New Zealand

Aotearoa-Land of the Long White Cloud

By Kathy Brader, Senior Bird Keeper
Smithsonian National Zoological Park, Washington, DC

For five weeks beginning in January 2005 I traveled extensively throughout New Zealand, from the Northland to Stewart Island. I went primarily to study kiwi (*Apteryx*) both in the wild and in captive institutions. I wanted to have a clearer understanding of how to better manage kiwi in captive situations and to experience where they live in the wild. All kiwi (according to the latest DNA study there are five species and two races) are protected and are in dire straits in the wild. To understand how these magnificent and unusual birds have come to suffer such devastations to their habitat and their rapidly decreasing numbers, one must first look at the natural history of New Zealand. My first article will deal with the natural history and some of the interesting wildlife, both extinct and the survivors. A second will follow with a focus on kiwi: natural behaviors, morphology, anatomy, and taxonomy.

New Zealand was once part of the large southern continent known as Gondwana, but has been isolated from other landmasses for between 85-90 million years. New Zealand consists of two large islands, North Island and South Island, as well as several smaller islands. The largest is Stewart Island, located at the bottom of South Island. New Zealand is truly the "land down under"; it lies 2000 miles south of the equator. It is not a large place, roughly about the size of Great Britain, Japan or the State of Colorado. One can travel from the tip of North Island to the tip of South Island, roughly about 1,000 miles. You are never more than 100 miles from the sea anywhere on the islands. It is the only land in all of Polynesia that has a temperate climate. The climate is mild with abundant sunshine and rainfall. Only at very high altitudes does the climate become consistently severe.

New Zealand straddles a fissure between two tectonic plates: the Indian plate to the west and the Pacific plate to the east. Because the tectonic and volcanic upheavals destroyed the fossil records of that period, not much is known. The survivors were the ancestors of modern plant and animal groups. Some of these remained in primitive groups that became extinct in the rest of the world. On North Island there are several active volcanoes and earthquakes are common on either island. Some of the smaller islands were connected by land bridges during the glacial period, and some never had any land connections. The rift between New Zealand and what became Australia occurred about 120 million years ago, while the Antarctic and South America were connected with New Zealand until about 85-90 million years ago. For all that time New Zealand lived in splendid isolation and birds ruled the world. Eighty percent of the species belonging to non-marine and plant groups are endemic; some of these belong to families and orders found nowhere else. At the time of the separation, reptiles were the dominant terrestrial vertebrates. The Cretaceous/Tertiary period saw the mass extinction of reptiles. New Zealand was free of ALL non-marine mammal species except for three species of bats.

Until approximately 2000 years ago New Zealand was truly a lost world. Until the 1990's, the Maori were believed to have been the first visitors and the first settlers about 800 years ago. Due to recent finds, sub-fossil data now suggests that humans came to the islands about 1000 years earlier. They did not survive or stay except to drop off the kiore (Polynesian rat, *Rattus exulans*). Kiores are poor swimmers and could not have arrived without assistance. Dr. Richard Holdaway used radiocarbon and other dating methods to determine that kiore were established on both islands at this time. Thus the first invasion of introduced mammals began. By the time the Maori permanently settled, this small-sized omnivore had already begun the local extinctions of bats, reptiles, small birds and large insects. They not only ate eggs and young, they competed with the locals for food. Due to their rapid reproduction rate, they spread throughout the countryside. As an example of the devastation these rats could produce, one only has to look at South Canterbury where the local extinctions of about 30 species of small birds, the greater short-tailed bat (*Mystacina robusta*), tuatara and Duvaucel's gecko (*Hoplodactylus duvaucelii*) are attributed to the kiore.

New Zealand was the last landmass to be settled, so charting the record of ecological change is more intact than other countries. During prehistoric times there were only three introduced predators: kiore, people and kuri (Maori dogs). Since the introduction of predators, 50% of the terrestrial and

freshwater bird species native to New Zealand mainland, five marine birds, three frogs, a bat and at least three lizards, some plants, one freshwater fish and an unknown species of invertebrates have become extinct. Of the 53 vertebrates lost from the islands all but two occurred nowhere else. An additional 13 species of endemic birds in the Chatham Islands have been lost. Although local extinctions occurred naturally throughout New Zealand, all known vertebrate species present during the Pleistocene survived somewhere in New Zealand until human contact.

New Zealand's frogs and reptiles have also suffered the same fate as the birds. Their frogs and reptiles are small and seldom seen. The Tuatara and native frogs are from groups that existed in other parts of the world, but were subsequently replaced by more advanced groups. These are among the world's most primitive and, for the most part, poorly studied group. Between 1980 and 1994 the number of lizard species grew to over 60 species.

The tuatara is a unique reptile found nowhere else in the world. Some people refer to them as a

living dinosaur; this is not correct as they are even older. They belong to the order of Spendonitida that originated in the Triassic period (about 225 million years ago). They are the only living representative of this genera. They have both primitive and specialized characteristics including: a primitive skull, teeth are bony protuberances on the jaw, low metabolic rate, and no penis A "third eye" - a pineal organ with a vestigial lens and retina (which becomes covered by opaque scales at about six months of age) is another of its primitive features. Among the specialized characteristics: heavy strong skull with fewer bones but with primitive features; cold-adapted - able to maintain temperatures as low as 7°C [44.6°F]; possesses a tapetum (a light reflecting surface on the retina, similar structures occur in other nocturnal animals). Their reproduction is worth mentioning as it's unique among reptiles. Females usually produce eggs only once every 4-5 years (although some have laid every 2nd year). Egg development begins within a year after the previous clutch was laid, but egg development may take several years. Once the eggs are fully developed, they mate in late summer (Jan-Mar), but the eggs are not laid until early the following

summer (Oct-Dec). The eggs are fertilized soon after mating but the shell production takes another 6-8 months. Once the eggs are laid, they are buried in chambers and take 12-15 months to hatch. Clutch size varies between 7-11 eggs (18 has been recorded). It takes 9-13 years to reach sexual maturity and they continue to grow for another 20 years. Males weigh about 1.0 kg (2.2 lbs.), and females about 0.5 kg (1.1 lbs.). The final word on their lifespan has yet to be determined, but 60 years is not unknown.

Tuatara were once widespread in New Zealand from the top of North Island to the tip of South Island. By the time the Europeans arrived they were absent or rare on both North Island and South Island, and gone from most offshore islands, all due to the kiore. They continue to decline and are extinct on 10 of the 40 islands they once occupied as little as 100 years ago. On rat-infested islands no young are found less than 180mm (7 in.) long. There are two species recognized: Tuatara and Gunther's tuatara (*Sphenodon guntheri*). Gunther's tuatara is restricted to 1.7 hectares (4.2 acres) of scrub on North Brother Island in Cook Strait and introductions on two other islands. The more



common tuatara is on about 30 islands off the northeastern coast of North Island and in Cook Strait. Ongoing eradication of rats and habitat protection on these islands will be the tuatara's main hope. The Department of Conservation (DOC) has an ongoing recovery plan in place for both species.

New Zealand also has been the home of some unique species of frogs and lizards. There are four living frog species, all are primitive, nocturnal, small and secretive. Three are terrestrial and the fourth lives beside water. All pass the tadpole stage inside the egg and hatch directly into tailed froglets. They lack tympanic membranes and eustachian tubes and vocal sacs. Thus they have poor hearing and make only shrill chirping calls. All native frogs are restricted to a few locations in the north half of North Island and two islands in the Marlborough Sounds. The introduction of kiore and subsequently larger predators has led to the serious decline of all frogs.

New Zealand is rich among other temperate regions with their lizards. The lizards are found in all habitats from intertidal rocks to alpine bluffs, semi-arid regions to rainforests. They have more species of lizards than California or Texas and, per area of land, more species than Australia. In the 1950's only 28 species were recognized; the most recent count is 59 with several waiting to be classified. At least three species are about to become extinct, 24 are rare and many survive only on island refuges. A species worth mentioning is the Black-eyed gecko (*Hoplodactylus rakiurae*), found only in the Kaikora Mountains and the Arthur range near Nelson. This species was only discovered in 1970 and was not seen again until 1983. They are found only on bluffs and rocky outcrops 1300-2200m (~4,000-7,000 ft.) above sea level, where heavy snowfalls are frequent. Even in the summer temperatures can fall to 5°C (41°F). All of the 70 or so geckos have been found on rock bluffs or outcrops, some distance from the tussock and herb field vegetation. It is the largest nocturnal gecko remaining on the mainland, probably due to the extreme and forbidding habitat that it lives in.

Although both species of tuatara, all four living frogs and 40% of the lizard species are threatened or endangered, it was not until 1981 that lizards had legal protection. Only since 1996 were all granted protected status. It is now illegal to hold in captivity any native reptile or amphibian without a permit, but conservation still lags far behind that provided for birds. At this point in time it hard, if not impossible, to determine the full impact predators have had on the reptiles. But, predators are the main threat and where these species have been put on predator-free islands, their numbers have increased. Habitat loss or major changes to the area are also a concern for these species. Since the early 1990's there has been increased management to benefit reptiles including pest control and recovery plans.

The only endemic mammal species are bats, which the Maori call pekapeka. There are two surviving genre of bats: the long-tailed bat and the short-tailed bat. There were two species of short-tailed bat. The Greater-short-tailed bat (*Mystacina robusta*) was declared extinct in 1964 and was found on two islands near Stewart Island. The second species, the Lesser short-tailed bat (*Mystacina tuberculata*) is endangered and found in only a few places on both main islands and two smaller islands. The species is further divided into three subspecies. This small size bat (12-15g / .4 to .5 oz.) is a ground hunter, using its "front limbs" to climb around. They are considered a lek breeder, with the males competing for singing posts to attract females. Their diet consists of insects, nectar and pollen. These bats play an important role in pollinating the endangered wood rose (*dactylanthus*): a parasitic plant that grows on the roots of trees on the forest floor. The long-tailed bat (*Chalinolobus tuberculatus*) is closely related to five other species of bats found in Australia, New Guinea and New Caledonia. The Long-tailed bat is found throughout North and South Islands, Stewart Island, Little and Great Barrier and Kapiti Islands. Long-tailed Bats are smaller (8-11g / .28-.38 oz.)) and are believed to produce one offspring a year. This bat's echolocation calls include a low frequency component that can be heard by some people. It can fly at 60 km per hour (37.2 mph) and has a large home range (~100 hectares / 2.471 acres). They feed like most bats taking insects in the air. This bat is also suffering a decline due to habitat destruction and introduced predators (cats, stoats, rats). DOC has a recovery plan for protecting and establishing new populations.

Since the world's most numerous inhabitants are invertebrates, a brief mention of a couple, some of the truly odd insects, is a must. So far there are 21,000 described species but this number could probably be doubled. The invertebrates have not escaped the introductions of mammals and other pests and many are threatened. The Weta (*Motuweta*) has been around since the Cretaceous period. They are related to crickets. Seventeen species of the 70 species are threatened. Some are among the world's heavy weights of the insect world, weighing up to 71g (2.5 oz.). Only one insect is larger,

the African Goliath Beetle (*Goliathus regius Klug*). These have evolved to take the place of mice in the forest. The Tree Weta (*Hemideina* sp.) use galleries that were originally excavated by moth and beetle larvae. The male enlarges the space to accommodate his harem. The Cave Weta (*Rhaphidophoridae* sp.) is actually a forest species and likes cool damp places. They are nocturnal but may gather in large numbers during the day. DOC has recovery programs in places for them.

The Giant Land Snails (*Powelliphanta*), the largest of this group can grow up to 90mm (3.54 in.) and weigh up to 90g (3.17 oz.). There are 21 species found on North, South and Stewart Islands. They are carnivorous eating earthworms, slugs and other snails. They have been around for 100 million years. They are threatened due to introduced predators, including possums, and habitat changes. In areas where DOC has undertaken possum control, recovery of the snail has been a success. As an example, in 1993 in the Kahurangi National Park searches could only locate three snails in each of the three sampling plots. In 2003, after a decade of possum control was maintained, about 15 snails were found in the plots.

It would be amiss not to mention some of the more unique species of birds found only in New Zealand - both extinct and the survivors. New Zealand is rich in bird life, especially in wetland and marine wildlife. Most of the world's bird species are terrestrial; but here the opposite is true, more than one-third are sea birds and another third are wetland types. It is not surprising when one looks at the lack of mammal predators and the richness of New Zealand wetlands. Over a half of the world's birds are passerines, yet here only 30 species of songbirds are found. Most of the terrestrial birds are endemic and filled ecological niches that differed from their counterparts in the rest of the world. There are 133 species of birds that breed only in New Zealand and the surrounding islands. There are two orders, one infra-order, three families, three sub-families and 38 genera of birds that are found only in New Zealand.

The Moa (11 species) occurred on both main islands, seven were found on North Island, nine on South Island. They each had preferred habitats that varied from species to species. There was tremendous diversity between the moas, which we are now only beginning to understand. They varied in size from the small Upland Moa (*Megalapteryx didius*), weighing about 20kg (44 lbs.) to the Giant Moa (*Dinornis giganteus*) whose weight exceeded 270kg (595 lbs.). Six species weighed more than 100kg (220 lbs.) (about the size of an Ostrich). All moas were herbivores. Some gizzards of the larger moas (*Dinornitidea* sp.) had gizzard stones of five kilograms in weight (11 lbs.). Several species of moa did co-exist in the same habitat as each species had distinctive bill morphology and could utilize different food items; they also ate at different heights. Most inhabited the lowland forests, but some existed in shrub land, grasslands in montane and sub-alpine zones. The Upland Moa had feathered legs as an adaptation for living in cold and sometimes snowy climate. They probably laid a single egg with long incubation periods. According to the latest information available, the moas were probably hunted into extinction in a little over 100 years by the Maori. It appears that as the local populations were hunted out, the Maori moved on to another location and hunted this easy prey. South Island, that has 120 documented moa-hunting sites, contains the remains of 100,000 to 500,000 moa. Since we will probably never find all the moa-hunting sites this number is probably on the low side. It is easy to see how these giant birds were eliminated in a relatively short time.

Although many people have heard of the moa, fewer people are aware that the world's largest eagle was found in New Zealand, Haast's Eagle (*Harpagornis moorei*). This bird of prey had a wingspan of 8-9 ft. (2.4-2.7m) and talons like tiger's claws. The females weighed about 13kg (28.6lbs.); the males about 10kg (22 lbs.). They hunted ground-dwelling birds, including the largest of the moas. In the Wellington Te Papa Museum they have a life-size diorama of the Haast's Eagle attacking the Giant Moa. The eagle was confined to South Island and to the forests with nearby open areas. They were the type of hunter that perched and pounced on their intended prey. Though most do not believe that the eagle ever preyed on Maori, the Maori have an oral history that implies otherwise. Rock art has been found that prove they co-existed.

The world's only flightless parrot was once widespread throughout New Zealand, by the 1970's where it was confined to Fiordland in South Island and Stewart Island. The Kakapo (*Strigops habroptilus*) is a large nocturnal parrot and the only representative of a sub-family. They have "soft owl-like" feathers and large feather discs around their eyes giving them an owl-like appearance. They were once hunted by the Haast eagle, then the Maori, followed by the Europeans. Habitat destruction (mostly clearing for farming) and introduced mammal predators hastened their decline. It is the heaviest parrot, with males weighing up to 4kg (8.8 lbs.). They are the only parrot with an

inflatable thoracic air sac. They are good climbers but prefer to raise their young on the ground, thus making it easy prey to cats, stoats and rats. They are the only parrot with a lek breeding system. The males dig out a bowl and spend the night making low frequency booming calls to attract females. This call can be heard up to 5kg (3 mi.) away. This may go on for four months. The females may travel several kilometers to reach a male; they then mate and depart to raise their offspring alone. Since they leave at night to forage, this leaves the eggs and chicks vulnerable to predators. The males begin to breed at about five years, while females do not begin until 9-11 years old. They do not breed every year and breeding is thought to coincide with the flowering of certain plants (especially the Rima trees). As of today, there are 86 birds left found on protected offshore islands. The last breeding year was in 2002 that added 24 chicks to the population. As of March this year (2005) the birds have laid 22 eggs with at least four confirmed fertile. They are a long-lived species, but as of now the utmost age is unknown. Sixty years is a good estimate. The race to save the Kakapo began in 1977 with around 218 birds. The birds were evacuated to offshore islands for their protection. DOC has several different support plans in place for protecting and aiding the remaining population.

The recovery of the Chatham Island Black Robin (*Petronica traversi*) is a success story that gives one hope for all critically endangered species. It's a small size all-black robin that stands only around five centimeters (1.96 in.) high. They live to be 6-13 years old. They eat a variety of insects. They often pair for life with a clutch size of only two eggs. They live under the canopy of the forest, spending a lot of time in the lower branches to shelter from the strong winds that buffet the islands. By 1980 only five birds remained; out of those five only one breeding pair was left. A management plan was initiated and the population now stands at 250 birds. This included the cross-fostering of eggs and young to enhance productivity. All of the robins alive are descended from that single pair. They are currently on South East Island and Mangere Island in the Chatham Island group. DOC is now attempting to establish a third population in a predator-free zone on Pitt Island. The two biggest threats to the remaining birds are disease (as they all have similar DNA) and the accidental introduction of predators.

An endemic wading bird that has also been successfully managed from low numbers is the Khaki or the Black Stilt (*Himantopus novaezelandiae*). It was once widespread throughout the wetlands on both North and South Islands. It is now only found breeding in the Upper Waitaki Basin in central South Island. The low point of just 23 birds in 1981 brought an intense management program to bear. Since they require large areas for breeding and foraging this does not make it a candidate for offshore islands. It is still one of the world's rarest birds. At the present time there are 61 birds left in the wild and a small population held in captive institutions. Khaki eggs from the wild are collected to be raised in captivity and kept to about 3-9 months of age and then released back into the wild.. This increases the survival rate for the young birds by preventing predation when they are most at risk. The next two phases of the Khaki Recovery Plan looks at decreasing the predator problems, habitat loss and increasing the number of birds in the wild.

The last bird species I want to discuss is the Takahe (*Porphyrio mantelli*), a large flightless, colorful green/blue rail. This is the largest living rail and was thought to be extinct until 1948 when a few pairs were discovered in alpine tussock grasslands in the Murchison Mountains, Fiordland, and on South Island. They stand about 50cm (1.7 ft.) weigh over 3kg (6.6 lbs.). They were once widespread throughout both main islands. By 1982 the population stood at 118 birds. DOC has since established pairs on four predator-free offshore islands; these populations stand at about 60 birds. Deer have been a primary concern in increasing the bird's numbers as they reduce the amount of nutrition available for the chicks and destroy the habitat. Since following the deer-control program, the numbers on the mainland have increased to about 130 birds. Fortunately, these birds are adaptable to a variety of habitats increasing the possible areas where they may live. The Takahe produce 1-3 eggs with only one chick surviving to adulthood. This allows DOC to remove "excess" eggs and raise the offspring in captive situations with minimal human contact, i.e.: use of hand puppets and models for brooding.

Although the introduction of the kiore was the start of the decline of New Zealand wildlife beginning about 2000 years ago, it was sped up rapidly by settlement of humans and their dogs. These first people were the Maori. By overhunting easy prey and changing the habitat by burning and deforestation, they managed to wipe out 40 species before the Europeans "discovered" New Zealand; first in 1642 by the Dutch explorer Abel Tasman. By killing four of the Dutch crew, other explorers were discouraged until British explorer Captain James Cook arrived in 1769. The first Europeans (Pakeha) who came did not settle for long periods of time as they were whalers and seal hunters.

Missionaries arrived in 1814. By the 1830's there were less than 1,000 permanent settlers. During this period the islands and the Maori were changed, new animals (most notably pigs) and new plants and metal tools made life easier. They also took to Christianity although they modified it to fit with their beliefs of the world. The Maori were a fierce people with individual tribes on both main islands. The musket wars between tribes wiped out thousands, and the introduction of diseases such as influenza and measles also took their toll. By 1840 the Treaty of Waitangi was signed by the British and Maori chiefs. This treaty granted full citizenship to the Maori and guaranteed their property rights. This treaty is still upheld, but sometimes legal battles over property rights occur. Part of the problem is that the Maori did not understand the ownership of land. This is important to understand as the current conservation programs that are in place and future plans have to consider the Treaty.

The Pakeha have only been on the islands for 200 years, but the speed of changes to the habitat and the deliberate introduction of mammals have forever altered the landscape of New Zealand. Acclimatization societies were not unique to New Zealand, they were popular all over the world, but they had a longer life in New Zealand and were more influential. They had the backing of everyone from the government, naturalists, leading citizens, even the church. Societies were formed (1860's) all over New Zealand with the idea of introducing the widest possible array of animals and plants. Although introductions have happened all over the world, it is in isolated places like New Zealand and Hawaii, (to name a few) that the effect has led to drastic consequences to the native fauna and flora. The Norway Rat (*Rattus norvegicus*) and cats came with Cook's ships and became established in several spots on the islands. By 1839, feral populations of pigs, Norway rats and goats were established. After this date the rate of introduction of animals and Pakeha settlements were on the rise. The numbers and kinds of animals, birds, insects and plants are very well-documented. Most were imported for farming and hunting, though some were brought in for strictly ornamental reasons. The total number of bird species known is 130, though doubtless others went unrecorded, only 39 species still have self sustaining populations. The last deliberate introduction of a bird species was the red-legged partridge (*Alectoris rufa*) in 1980.

Six species of marsupials and rabbits, eight species of deer, tahr, chamois, goats, pigs, horses, cattle and sheep are some of the mammals that have successfully become feral populations. Most were introduced before the 19th century. It is an interesting note that the once thought extinct Parma wallaby (*Macropus parma*) was shot on Kawau Island (in the 1960's). This is one of the many exotic species that were released on this island between 1861-1879 by Sir George Grey. He had purchased this island and built a huge estate that he then stocked with many types of exotics, some of which successfully became self-sustaining. The Parma wallaby was rediscovered in 1965 on the island and was given protected status (the only mammal ever granted this). Between 1967-1975, 736 of the wallabies were sent to various zoos and sent back to Australia. The protected status was revoked in 1984 after a small feral population was discovered in New South Wales. They are now considered a pest species and are to be shot on sight in New Zealand.

The deer populations were managed in the early days to produce good hunting trophies and meat, but within 30-50 years they had managed to become over-populated in areas, destroying native plants and changing the habitat. Starting in the early 1900's the deer were a major pest, and by 1930 the government had deer cullers out to eradicate the deer problem. The deer culling came to an end in the 1960's when private farmers began the practice of deer farming (Germany was, and still is a big buyer of New Zealand deer meat, followed closely behind by California). Antler velvet is exported to Asian markets. Rabbits were introduced early on in the 19th century but it did not take long for people to consider them a pest. By 1870 the farmers had to decide which species to introduce to eliminate (unsuccessfully) the rabbit. Stoats, weasels, and ferrets were introduced, but they only ended up decimating the ground-dwelling native birds. The stoat is now considered "public enemy number one" for New Zealand birds. The Australian Brush Tailed possum (*Trichosurus vulpecula*) was first introduced in 1837 to establish a fur trade; there is now estimated to be about 70 million in the wild. They are estimated to eat about seven million tons of vegetation a year. That is necessary food for the native wildlife that is no longer available. It takes a possum only two years to destroy a fully-grown tree by constant eating. They also disturb nest birds, eat chicks, and eggs. They also spread bovine tuberculosis that is a major concern for farmers. The fur they are prized for is used with that of Merino sheep to produce the super-soft wool that has won worldwide renown. The last two introduced species important to mention are the cat and dog. I will just briefly touch on some of the devastation that these have produced on the native wildlife. In the late 1800's the only known flightless perching bird known in New Zealand, the Stephens Island Wren (*Traversia lyalli*) was discovered and then eliminated by the lighthouse keeper's cat. Only 17 specimens are known to

have been collected. Many species of birds were eliminated from smaller islands by predation due to cats. In the Chatham island group, they eliminated at least two species of seabirds and most of the forest birds by 1950. Dogs have been, and are still a big threat to ground-dwelling birds, especially kiwi.

New Zealand is a world conservation leader, but this does not mean that conservation of endemic species is totally embraced by all the people living there. Kiwi (what New Zealanders call themselves) are, for the most part, big hunters and the restriction on deer and tahr, for example, have led to legal battles for the right to hunt and to keep some of these species in very sensitive areas where conservationists want to eliminate them completely. There are people who think that the possum should not be eliminated both for their fur and that they are "cute" mammals. The Wild Animal Control Act in 1977 gave DOC the authority to prepare wild animal control plans and implement them. The main function of DOC is the protection of native flora and fauna; this necessitates the elimination or control of introduced pests. DOC works in consultation with the local Iwi and interested parties on the best methods to use in areas; this hopefully will eliminate or avoid future conflict and litigation.

There are several methods that DOC uses depending on what species is being targeted. For possum and rabbit control, the controversial use of the poison 1080 (sodium monofluoroacetate) has been in existence since the 1950's. Fluoroacetate is the active ingredient of 1080. It is a natural compound found in plants of South America, South Africa and Australia; scientists think it is the plant's defense against browsers. The use of this poison is not accepted by all people. DOC uses it in aerial drops and boxes. There are several reasons why this poison is used; it is the only one approved for aerial drops, and it is cheap and kills a wide range of other pests including rats, cats, stoats, deer, goats and rabbits. It does not build up in the food chain as it quickly breaks down in the animals that ingest it (in non-fatal doses), though it can take weeks or months to break down in a carcass and remains highly toxic. This puts dogs at risk if they scavenge on dead possums. The poison 1080 breaks down quickly in water and subsequent testing was unable to find any significant presence after operations. Contractors are required by law to keep bait 20 meters away from any body of water. It breaks down rather rapidly in soil, in one to two weeks (may be longer in cooler temperature). It has been known to kill some native birds, directly or indirectly, though the methods have improved in recent years to make the bait less attractive to native birds. Some recent studies on radio-tagged kiwi and kaka after 1080 drops showed no deaths; never the less some native species do die after a drop. The current thinking is that the birds will come back after any losses due to the elimination of the predators. Current studies show that most native species recover any losses fairly quickly. Researchers have found no long-term impact on native bird populations.

Studies on long-term impact on invertebrates show little harm done, but this may not be the final word. Overseas studies have shown that amphibians have to ingest large quantities to suffer any effects, and tests in New Zealand have shown that trout and other aquatic life are unaffected. When DOC prepares an area for a drop or puts out poison boxes (these are carried out on lands that have protected wildlife on them), they post signs, informing the local residents to help insure that no accidental poisonings happen. They only carry out the drops in five to seven-year cycles in any area. Why use aerial drops? In many places in New Zealand the habitats are steep and inaccessible, making it difficult to use anything else. Hunters are one of the biggest opponents to its use, as they worry it will eliminate the deer herds. Traps are also widely used for stoats, ferrets and cats. These are expensive and time-consuming, but fairly effective in controlling these pest species in smaller areas.

New Zealand has the use of some offshore islands that are not inhabited by people. Though initially expensive to start up, as it requires the total elimination of non-native species, these have proved to be a haven for many of the endangered birds. Some are not open to the public but several are available for day-trippers to enjoy. Another project, albeit expensive, is the fencing of certain areas on the main islands for the use of native species. These fence lines are predator-proof and must be constantly attended to keep them up and keep back the forest line. But these safe havens allow the birds to remain on the main islands. Constant care is given to both the offshore islands and the predator-free havens on the main lands to ensure that pest species are kept out. Both of these projects protect not only native birds but also native plants species that have also suffered under threats (logging, predators).

The flora and fauna of New Zealand are a glimpse into a lost world; the landscapes are breathtaking. From the towering mountains in the deep south, to the rainforests on North Island, these habitats are not to be seen anywhere else in the world. The fauna and flora is among the most strange and fantastic you will ever encounter.

I found the dedicated staffs of DOC and zoos (both private and public) to be among the most professional and caring I have ever met. I was welcomed into homes of new and old friends with equal magnanimity. The next article will be dedicated to the kiwi, both the bird and the people with whom I had the privilege to work during my stay.

References

- Billing, Tony. January 1998. Kiwi Workshop Proceedings. Auckland Zoo. New Zealand.
- Department of Conservation. 1996-2006. Kiwi Recovery Plan. Wellington, New Zealand
- Department of Conservation. 2004. Captive Management plan for Kiwi. Wellington, New Zealand.
- Grezelewski, Derek. 2000. Kiwi-icon in trouble. New Zealand Geographic. Number 45:66-97. Australian Consolidated Press, Auckland, New Zealand.
- Holmes, Tim. Hankey, Lisa. Oliver, Sophie. 1999. Captive Management Plan for North Island Brown Kiwi. New Zealand Conservation Management Group. New Zealand.
- Jacobs, Warren. 2002. The New Zealand Experience. New Holland Publishers. Auckland, New Zealand.
- Johnson, Tracy. 1996. Husbandry Manual for North Island Brown Kiwi.
- Kanze, Edward. 1992. Notes from New Zealand. Henry Holt and Company. New York.
- Orbell, Margaret. 2003. Birds of Aotearoa. Reed Publishing Ltd. Auckland, New Zealand.
- Peat, Neville. 1990. The Incredible Kiwi. A Wild South Book. Auckland New Zealand.
- Peat, Neville. 1999. Kiwi New Zealands Remarkable Bird. Random House. New Zealand.
- Peat, Neville. 2000. Stewart Island. University of Otago Press. Dunedin. New Zealand.
- Wilson, Kerry-Jayne. 2004. Flight of the Huia. Canterbury University Press. Christchurch, New Zealand.
- Wolfe, Richard. 2000. The People's Bird. New Zealand Geographic. Number 45:12-20. Australian Consolidated Press, Auckland, New Zealand.

Editor's Footnote: A population of rare tuatara has been given a boost with the birth of 15 youngsters at Auckland Zoo. The rare Cuvier Island tuatara (*Sphenodon sp.*) hatched from a clutch laid at the zoo in November, boosting the sub-species' numbers to 48. Auckland Zoo first received six adult tuatara from Cuvier Island, off the Coromandel Peninsula, in 1990. To date, the zoo has bred and released 18 juvenile tuatara back onto the 202ha island. *Source: the New Zealand Herald 9/17/05*

Chapter News Notes

Dallas Chapter AAZK

The following is a list of how we spent the money set aside from the 2004 AAZK Conference. We want to thank everybody who contributed to the success of the conference.

<u>Organization (and fund if specified)</u>	<u>Amount</u>
Chimfunshi Wildlife Organization	\$1,500.00
African Wild Dog Conservancy	\$300.00
Project Lemur	\$500.00
Adopt-A-School Program	\$500.00
Jane Goodall Institute/ Graueri Landscape Effort	\$1,000.00
The Ground Hornbill Project - South Africa	\$50.00
Operation Migration - USA	\$184.00
Hornbill Research Foundation	\$240.00
The Clouded Leopard Project - Conservator Level	\$50.00
Audubon Texas/Dogwood Canyon	\$701.00
The Nature Conservancy - 3 Acres Indonesia	\$225.00
DZS- Anegada Radio Transmitters	\$600.00
Madagascar Fauna Group	\$750.00
Smithsonian Institution/ Wild Dog Project	\$300.00
International Conference on Zookeeping	\$750.00
Friends of Conservation - Anne K Taylor Fund, Bushmeat Crisis	\$1000.00
Gilman International Conservation - Okapi project	\$1000.00
Friends of the Colobus Trust - Veterinary Hospital	\$3000.00
Bowling for Rhinos	\$1000.00
Friends of Colobus Trust - Colobridge	\$400.00

The Sumatran Tiger Trust	\$400.00
Lewa Wildlife Conservancy - Lewa Education Trust	\$500.00

We also donated:

- \$2000 to the 2005 AAZK Annual Conference
- \$3000 to the AAZK, Inc.
- \$4000 was earmarked for the Center for Ecosystem Survival meter enhancements at the Dallas Zoo
- \$2500 was earmarked for the Dallas AAZK travel fund

---Erica Malmberg, Chapter Liaison



Correction from Sept. '05 Chapter News

Under the Oklahoma City AAZK Chapter News published in the September 2005 *AKF* there were two errors in their submission. It should have read "Democratic Republic of Congo" not "Dominican Republic of Congo"; and it is "Dian Fossey" not "Diane Fossey".

What's your AAZK Chapter been up to? Let us know about your successful fundraisers, guest speakers, conservation projects, new officers, new logos, etc. We want to hear from you!

**Send your Chapter News to the
AKF Editor at:**

akfeditor@zk.kscoxmail.com

Institutions wishing to advertise employment opportunities are asked to send pertinent data by the 10th of each month to: Opportunity Knocks/AKF, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054. Please include closing date for positions available, and when setting these dates keep in mind that because of bulk-mail, most readers do not receive their AKF until the middle of the month or later. There is no charge for this service and fax or e-mail listings of positions which become available close to deadline are accepted. Our Fax is (785) 273-1980; e-mail: akfeditor@zk.kscoxmail.com. Listing must be sent as MS Word attachment. To post a position on the AAZK website, have listing to email address above by the 25th of the month for posting on the first day of the following month. We are no longer located at the Topeka Zoo, so please note new address to avoid delays in processing.

Zookeeper, Lead (Raptors) - Woodland Park Zoo, Seattle, WA

To apply please complete the application provided on the main "Jobs" page of the Woodland Park Zoo web site: www.zoo.org, and email cover letter and resumé to Woodland Park Zoo Human Resources Department: Attn: Zookeeper, Lead Position - Email: hr@zoo.org; Fax: (206) 684-5392; US Mail: Human Resources, Woodland Park Zoo, 601 North 59th Street, Seattle, WA 98103. (No Phone Calls Please) **Application deadline: November 14, 2005.** Applications are now being accepted for Zookeeper, Lead in the Animal Management Department. There is one (1) full-time, regular, benefited position to be filled at this time, and from this hiring process, one (1) hire will be selected. This position reports to the Collection Manager. FLSA Status: Non-exempt; Pay Grade: \$19.57 per hour. **Responsibilities:** This position is responsible for the day-to-day animal care operations within specific assigned areas of the zoo. Promote teamwork and act as liaison with other departments. Essential Duties and Responsibilities: include the following: Coordinate the work of Zookeepers, Zoo Attendants, and volunteers in their assigned areas; Inspect animals and animal facilities to ensure they are properly cared for and maintained; Observe animal behavior, report abnormal behavior patterns and provide technical advice to management and staff; Prepare food for assigned animals; assist in the development of animal diets; Clean and disinfect assigned animals and exhibit areas; Implement and maintain treatment plans and preventive health programs as prescribed by Zoo Veterinarian or Zoo Curators; Identify and communicate safety concerns to management in a timely manner; Participate in the capture and restraint of dangerous animals as directed by management; Mentor and assist with staff training; Provide relief coverage for Zookeepers and Zoo Attendants; Recommend and implement animal care procedures and policies, including record keeping; Maintain supply inventories; Assist with the physical transfer, shipment, or receipt of animals; Support special animal care activities such as physical examinations, minor exhibit repairs and modifications, and major exhibit maintenance projects; Take a lead role in the development and implementation of the raptor behavioral husbandry program; Plan, prepare, and conduct public presentations on raptor biology and conservation, both on-site and off; Participate in exhibit design process and implementation, as directed; Provide technical assistance to internal or external researchers conducting authorized zoo studies; Represent the Woodland Park Zoo to the media, as directed; Conduct behind the scenes tours, as directed; Support fundraising/development efforts of the Zoo; Perform other duties as assigned. **Qualifications/Requirements:** Demonstrated experience in the care and management of birds of prey is essential, including training birds for free flight public programs. To perform this job successfully, an individual must be able to perform each essential duty satisfactorily. The requirements listed below are representative of the knowledge, skill, and/or ability required. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions. **Education/Experience:** Bachelor's degree in a Life Sciences field from an accredited four-year college or university; and five (5) years related experience and/or training; or equivalent combination of education and experience required. Demonstrated experience in the care and management of raptors, and presentation of free flight public programs with raptors are essential. Seeking two years experience in an AZA-accredited facility. This position may require that the individual be available or on-call 24 hours a day. Weekend, evening, and holiday work may be required. Certificates, Licenses, Registrations: TB Test done annually. **Physical Demands:** The physical demands described here are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions. While performing the duties of this job, the employee is regularly required to use hands to finger, handle or feel, and talk or hear. The employee is frequently required to stand; walk, and reach with hands and arms. The employee is occasionally required to sit; climb or balance, stoop, kneel, crouch, or crawl while cleaning animal exhibits. The employee must frequently lift and/or move up to 35 pounds and occasionally lift and/or move up to 100 pounds when cleaning and maintaining exhibitry and moving animals. Specific vision abilities required by this job include close vision, distance vision, peripheral vision, depth perception and ability to adjust focus. Evaluating animal health, diet, or environment requires hearing, smell, and a variety of vision capabilities. Interaction with visitors and animals requires talking and hearing.

The following two (2) positions are being offered from the Environment Agency - Abu Dhabi (EAD), a Governmental Agency based in Abu Dhabi, United Arab Emirates. Applications: Interested candidates should send their CV, a letter explaining their professional experience and address of two (2) references to: Human Resources Department, P.O. Box 45553, Abu Dhabi, United Arab Emirates. Tel: +971 2 693 4621. Fax: +971 2 681 7358. Email: halabed@ead.ae. Closing Date: This recruitment is urgent and the successful candidates are expected to be able to start as soon as possible. Deadline for application: one month from the date of advertisement

(11/12/05). Successful applicants will be expected to work effectively in a team environment and actively support and implement NARC policies, procedures and protocols to ensure the highest standards of care for the collection. **Working environment:** NARC is situated in a remote, isolated desert location of the Abu Dhabi Emirate at 30-minute minimum of the closest town. The seasonal nature of much of NARC's D2s work means that certain times of the year will require very intensive working so the successful candidate must demonstrate flexibility regarding work schedules.

Position #1

Research Associate/Aviculture - Houbara Bustard Breeding Unit at the National Avian Research Center (NARC), now part of the Environment Agency Ö1 D2 Abu Dhabi (EAD), a Governmental Agency based in Abu Dhabi, United Arab Emirates. The Research Associate, Aviculture will be part of a team responsible for the day-to-day management of houbara bustards (*Chlamydotis undulata*) held in NARC's captive collection. The Research Associate, Aviculture will implement aviculture practices under the supervision of the Houbara Programme Manager and a Senior Aviculturist. **Responsibilities include:** Supervision of the incubation, chick rearing and breeding of houbara bustards; Performing artificial insemination and semen collection; Working with and supervising a team of bird keepers and technicians; Training of new personnel as well as scheduling staff; Responsibilities also include maintaining department records, analyzing data and writing reports. **Requirements:** The successful candidate should hold a Bachelor's degree (BSc) in Wildlife Management, Avian Production, Zoo Biology, or related field and at least two (2) years working experience. The candidate should be computer literate, possess strong communication and interpersonal skills, be able to work and communicate within a multi cultural environment. The successful candidate must be fluent in English. Arabic would be an asset.

Benefits Package: EAD offers a competitive package, including Housing Allowance (paid in cash on a monthly or annual basis), furniture purchase allowance (one-time payment), medical insurance, annual leave tickets, annual leave of 30 working days, interest-free car loan and educational assistance for eligible dependents

Position #2

Technician A, Aviculture - Bustard Breeding Unit at the National Avian Research Center (NARC), now part of the Environment Agency Ö1 D2 Abu Dhabi (EAD), a Governmental Agency based in Abu Dhabi, United Arab Emirates. The Technician A, Aviculture will be part of a team responsible for the day-to-day management of houbara bustards (*Chlamydotis undulata*) held in NARC's captive collection. The Technician A, Aviculture will implement aviculture practices under the supervision of Aviculturists. **Responsibilities include:** The provision of assistance to the Aviculturists in all phases of operations in houbara and other bustard species' captive breeding; Full responsibility jointly with aviculturists of certain areas of activities such as incubation, chick rearing, and sperm assessment; Working with and supervising a team of bird keepers; Training of new personnel; Responsibilities also include maintaining department records **Requirements:** The successful candidate should hold a Higher Diploma in Wildlife Management, Avian Production, Zoo Biology, or related field and at least two (2) years working experience. The candidate should be computer literate, possess strong communication and interpersonal skills and be able to work and communicate within a multi cultural environment. The successful candidate must be fluent in English. Arabic would be an asset. **Benefits Package:** EAD offers a competitive package, including Housing Allowance (paid in cash on a monthly or annual basis), furniture purchase allowance (one-time payment), medical insurance, annual leave tickets, annual leave of 25 working days, interest-free car loan and educational assistance for eligible dependents.

Animal Keeper - Greater Vancouver Zoo, Aldergrove, BC, Canada

Applications and questions may be directed to Jamie Dorgan, Animal Care Manager at jdorgan@gvzoo.com or by fax: 604-856-6857. This is a full-time permanent position within the union. Starting pay is \$11.38 per hour.

Responsibilities: Animal Keeper required to work with the animal care team at the Greater Vancouver Zoo. This position may involve working with a variety of species including mammals, birds, reptiles and amphibians.

Requirements: Must be able to work outdoors year-round, be in good physical condition, work well with other staff and do presentations for the public. Must have a combined four (4) years animal related education and experience. A bachelor's degree in an animal-related field is preferred.

General Curator - The Lee Richardson Zoo, Garden City, KS

Submit application, resumé, and cover letter to Jim Berry, HR Director, PO Box 499, Garden City, Kansas 67846 or hr@garden-city.org. (No faxed applications or inquiries will be accepted.) Closing date is February 1 2006, or until position is filled, whichever comes first. Applications available to download at www.garden-city.org or by calling 620-276-1175. E.O.E. The Lee Richardson Zoo, an accredited AZA facility. Salary range is \$33,092 - \$45,115 with excellent benefits and retirement plan. **Responsibilities:** This position is responsible for living collection, including animal health and welfare, collection planning, selecting and supervising animal care personnel, communicating effectively with assigned staff and collaborative partners, assisting with exhibit

design, general operations and other management issues. Reports and is responsible to Zoo Director. **Requirements:** A Bachelor's degree in Life Sciences and three to five (3-5) years husbandry and management experience in an AZA-accredited or similar institution preferred. The ideal candidate will have strong team leadership and management skills, a positive attitude, the capability to multitask, and excellent communication skills.

Herpetologist - National Aquarium in Baltimore, Baltimore, MD

The National Aquarium in Baltimore is seeking a Herpetologist to maintain exhibits and living collections associated with a new exhibit —*FROGS: A Chorus of Colors*— scheduled for opening in mid-December 2005. This exhibit will display a diverse collection of anurans. Please apply online at: www.aqua.org/employment.html or fax to: 410-986-2350. Position open until filled. **Responsibilities:** Assist with all activities associated with new exhibit installation, including habitat preparation, planting, filtration start-up, lighting installation and exhibit stocking. Services exhibits prior to visitor arrival, including cleaning, misting, feeding, maintenance of filtration, misting and lighting systems, water quality and other environmental monitoring. Maintains display, back-up, outreach collections, and live food colonies. Provides varied diet and proper nutrition for collection. Implements quarantine protocols for new acquisitions and monitors collection health. Works with the Medical Department to implement treatments as needed. Implements captive-breeding programs and specimen transports, as needed. Works with the Education Department on educational programs and cares for outreach collection associated with the exhibit. Works with volunteers and interns. Provides coverage in existing Rain Forest and Australian River Gorge Exhibits, as needed. Participates in field collection/research and maintains records, as needed. **Requirements:** Bachelor's Degree in herpetology, biology or related field, or equivalent experience and previous work experience in a professional animal care facility required. Experience in the display, care and propagation of amphibians, reptiles and invertebrates. Experience with naturalistic terrarium/vivarium displays, plant care and associated life support equipment is desired. Ability to work in a team environment and interact with and educate visitors. EOE.

Keepers/Vet. Technicians - Hattiesburg Zoo, Hattiesburg, MS

For more information regarding this position please contact John Wright, General Curator, Hattiesburg Zoo, Hattiesburg, MS 39401, (601) 545-4576, email: jwright@hattiesburgms.com. The Hattiesburg Zoo has an opening on its Animal Care team. We are seeking a career driven, creative, team-oriented individual. **Responsibilities:** This position will be responsible for, but not limited; daily husbandry, exhibit cleaning and maintenance, diet preparation and feeding, documentation, conditioning and training of collection, educational programs, and veterinarian assistance. **Requirements:** high school graduate (college degree preferred) and previous exotic animal care experience (paid or volunteer). This is a full-time position with state benefits, salary commensurate with experience and qualifications.

Elephant Handler - Ringling Bros. and Barnum Bailey Circus

Interested persons should send a resumé to Feld Entertainment: Fax: 800-637-8914; Email: hshugerman@feldinc.com or call (941) 721-1215. EOE, Drug-Free Workplace. We offer a competitive salary and benefits. If working with Elephants appeals to you, we have a great opportunity. Ringling Bros. and Barnum Bailey Circus has immediate openings for elephant handlers who aren't afraid to work hard caring for our elephants. **Responsibilities:** include total animal care such as grooming, feeding, cleaning and exercising animals. You must be able to work flexible hours and must be able to lift/move up to 75 lbs. **Requirements:** Prior experience working with Asian Elephants in a Free-Contact environment is preferred. 100% travel throughout North America is required. Majority of travel is in the United States.

Lead Animal Supervisor - Herpetology/Aquarium Dept. - Abilene Zoological Gardens, Abilene, TX

Send resumé or direct inquiries to City of Abilene, Human Resources, P.O. Box 60, Abilene, TX 79604. Fax to (325) 676-6212, or e-mail terry.shuffield@abilenetx.com. Visit our website at www.abilenetx.com. This position will remain open until filled. EOE. Specific questions about the position can be answered by Doug Hotle/Curator, at (325) 676- 6451 or e-mail at doug.hotle@abilenetx.com. The Abilene Zoological Gardens and the City of Abilene, Texas are excited to announce that we are seeking a team-oriented individual to fill the position of Lead Animal Supervisor to oversee the Herpetology, Aquarium Department. **Responsibilities:** The position will oversee and participate in the day-to-day care and maintenance of animals in their charge, their enclosures, facilities, and personnel. There will be a strong emphasis in participation in AZA conservation programs and psychological and environmental enrichment for the animals. The selected individual will play a leading role in the design and completion of the zoo's new Herpetarium. **Requirements:** for the position include an Associates degree in one of the life sciences, at least three (3) years experience in an accredited institution, with at least one (1) year in a supervisory role. Some mammal and horticulture experience is a plus. Must have strong communication skills both verbally and in writing. Experience with venomous and other potentially dangerous

reptiles is required. Knowledge of aquatics (including sea water) and their life-support systems is desirable. This is a physical position requiring the ability to climb, stoop, and crawl regularly. Must be computer literate. Must have a valid Texas driver's license, or the ability to obtain one. Any combination of experience and education may be considered. Salary for the position is \$2207.25 per month (\$1,018.73 bi-weekly) and an excellent benefits package.

Bird Keeper - Bronx Zoo (WCS), Bronx, NY

Send resumé with cover letter to: Wildlife Conservation Society, Human Resources, Box Bird ,2300 Southern Blvd., Bronx, NY 10460 or submit your resumé via email to hr@wcs.org, include the Box Bird in the subject line. The Wildlife Conservation Society seeks candidates for the position of Wild Animal Keepers in the Bronx Zoo's Bird Department. **Responsibilities:** Bird keepers are responsible for the well-being and care of a diverse collection of birds, maintaining natural habitat exhibits and public areas, enrichment, and record keeping. **Requirements:** A Bachelor's degree in a zoological field plus two (2) or more years of aviculture experience is desired, preferably in a zoo setting. Candidates must be enthusiastic, conservation oriented, energetic, and able to interact with other staff and the public. EOE. Competitive salary and benefits package.

Entry Level/Part-time Animal Keeper - Animal Edutainment, Inc., Aubrey, TX

Please send resúmes to: Animal Edutainment Inc., Attn: David Kleven, 7151 Cedar Lake Rd., Aubrey, Texas 76227; or email: critterman@animaled.com www.critterman.com; 940-365-9741. 20-35hrs week. Animal Edutainment's facility is located 35 miles North of Dallas, Texas or a 20- minute drive from Denton, TX. It takes more than a love of animals. It takes a solid respect of animal boundaries and behaviors, an ability to follow direction, and learn. **Responsibilities:** Duties may include, but are not limited to: Maintenance of animal enclosures and surrounding areas; Pick-up produce daily & diet preparation; Inventory supplies i.e. produce, dry feed & bedding; Conduct "rounds" to ensure enclosures are secured & animals have fresh water; Observation & records; Construct and provide behavioral enrichment. **Requirements:** Applicant must be responsible, mature, self-motivated individual with dedication, a strong work ethic, and stamina. Did we mention a willingness to use your muscles (must be able to lift 50 lbs.) and get dirty? Works well on own, as well as with others. Displays a willingness to follow direction, and take responsibility for actions. Negative TB test, tetanus shot, and excellent references required. Applicant must be 21 years or older. Must also be responsible, reliable, dependable, punctual, and committed.

Volunteer Animal Care Specialist Intern - Great Plains Zoo & Delbridge Museum, Sioux Falls, SD

If interested, please send a cover letter and resumé: Jay Tetzloff, Director of Animal Programs, Great Plains Zoo, 805 S. Kiwanis Ave., Sioux Falls, SD 57104. jtetzloff@gpzoo.org The Great Plains Zoo, Delbridge Museum is offering an opportunity for education and experience for tomorrow's workforce. The Great Plains Zoo and Delbridge Museum of Natural History has several internship opportunities available to those interested in pursuing a career in Animal Care and Zoo Management. **General Statement of Duties -** The Animal Care Specialist Intern is responsible for assisting the Animal Care Specialist in the care and feeding of zoo animals including the cleaning and maintenance of buildings, grounds, and exhibits. **Responsibilities:** Assist the Animal Care Specialist in the general daily care of the animals in the assigned exhibit and holding areas. Maintains exhibits and holding areas in a clean and presentable condition at all times. Assist in the observation the animal collection for signs of illness, general lethargy, injury, and dietary problems. Responsible for other duties as assigned by the Senior Animal Care Specialist and/or the Director of Animal Programs. The Animal Care Specialist Intern reports directly to the Senior Animal Care Specialist and/or Director of Animal Programs. **Requirements:** Requires a high school diploma or GED certificate. Prefer candidates that are pursuing a degree in a zoological related field. Must be able to work weekends, holidays, and evenings as assigned. Must commit to a schedule; 300 hours is required for successful completion of internship. Must also maintain a valid drivers license. Must have the ability to follow oral and written instructions. Must be able to climb ladders/stairs, lift and carry crates/ animals/feed weighing 70lbs., operate mowers, handle fire hose for cleaning, operate weed eaters, load and operate wheel barrows loaded up to 150 lbs., be agile and flexible to maneuver in and around animals within exhibits, corrals and holding areas. Must have strong communication skills as speaking to the general public is required. May be asked to complete season-long project as assigned by the Senior Animal Care Specialist and/or the Director of Animal Programs. Health and Safety: Must maintain current tetanus vaccination (5 years) and be willing to have annual TB test done. Must be able to lift and carry up to 70 lbs.

Aviculture Interns Wanted - The Hawaii Endangered Bird Conservation Program at the Keauhou Bird Conservation Center (KBCC) on the Big Island of Hawaii and the Maui Bird Conservation Center (MBCC) on the island of Maui. For more information on internships at KBCC, please send a resumé, cover letter and the names and contacts of three (3) references to: Tracey Goltz P.O. Box 39 Volcano, HI 96785 or fax: 808-985-7034. For more information on internships at MBCC, please send this information to: Richard Switzer 2375

Olinda Road Makawao, HI 96768 or fax: 808-572- 3574. **Responsibilities:** Daily tasks include husbandry duties such as: diet preparation, aviary and facility maintenance, behavioral observations of breeding birds, grounds keeping, predator control. **Requirements:** Applicant must be able to live with several roommates in a remote area and should show enthusiasm for work with captive endangered Hawaiian birds. Applicant must have a valid driver's license and health insurance. Internships last for a 3-6 month period. Interns receive \$20/day stipend plus housing.

Big Cat Internships - Tiger Creek Wildlife Refuge, Tyler, TX

For more information or to download an Application Packet, see <http://www.tigercreek.org/internships.html>, no telephone calls please, all applicants must complete the Application Packet process for consideration of program participation. The Big Cat Internship as seen on Animal Planet involves Animal Care Apprenticeship and Public Educational presentations involving Big Cats This is a 90-day position (by 4 quarters/terms) allowing one to gain experience in the zoological field. **Responsibilities:** Job duties include cleaning, diet preparation, light maintenance, educational tours, etc. Interns are responsible for the daily cleaning and health monitoring of a large number of exotic feline species including but not limited to tigers, lions, leopards and pumas. Big Cat Internship opportunities also include working in environmental education with schools and youth groups in a variety of learning activities. Interns will present short guided lessons on animal care techniques, conservation and rescue methods, backgrounds on the big cats and much more. This wide variety of teaching opportunities and educational training provides the intern with an exciting array of new skills and experiences. Training is provided by the staff. **Requirements:** At least two (2) years of undergraduate college work in wildlife management, education, biology, or related field. If no college experience then two (2) years of verifiable work experience in unrelated field or one (1) year of work experience in animal care field. All applicants must be at least 20 years of age by start date. These positions require motivated persons with a career focus in biology/zoology/wildlife management. Housing is provided for these non-paying positions. Interns provide a strong commitment to the refuge, with a six- day work week and light duties on Sundays.

Internship - (Tigers For Tomorrow Exotic Animal Preserve) Fort Pierce, FL

To apply send cover letter and resumé to: Susan Steffens/ Executive Director- Tigers For Tomorrow, 18905 Orange Ave, Ft. Pierce, FL or email to Sue@tigersfortomorrow.org. This non profit organization is seeking two (2) possibly three (3) student interns for the 2005 fall season. Tigers For Tomorrow is a last stop exotic animal rescue preserve that houses and specialize in big cats. The preserve is in the beginning stages of moving to a new facility, interns will assist management in the move and care of the animals. **Responsibilities:** The intern will assist in the daily husbandry of preserve residents, assist in interpretive talks, work with the public. **Requirements:** Desirable qualifications include the ability to communicate effectively with people, writing skills, orientation to details, and be a self- motivator. Benefits include room and board, and \$50.00 a week. Personnel transportation is required.

More Zoo vacancies can be seen by visiting:

American Zoo and Aquarium Association - Job Listings
<http://www.aza.org/JobListings/>

American Association of Zoo Keepers - Opportunity Knocks
http://www.aazk.org/animalKeepersForum/opportunity_knocks.asp

European Association of Zoos and Aquaria - Vacancies
<http://www.eaza.net>

Australasian Society of Zoo Keeping (ASZK)
<http://www.aszk.org.au/Zoo%20Positions%20Vacant.htm>

Berufsverband der Zootierpfleger e.V
<http://www.zootierpflege.de>

Zoo Vets, Technicians and interns
http://www.aazv.org/job_openings.htm

Bird Jobs in the Field
<http://www.birdingonthe.net/maillinglists/BJOB.html>

AAZK Membership Application

check here if renewal []

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Address _____

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\$40.00 Professional

Full-time Keepers

☐

\$35.00 Affiliate

Other staff & volunteers

☐

\$35.00 Associate

*Those not connected with
an animal facility*

☐

**\$65.00 or up - Individuals
Contributing/U.S.**

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\$125.00 or up

Institutional/U.S.

*Organizations/Institutions
(requires Board approval)*

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International Members

\$55.00 International

*All members outside U.S. &
Canada regardless of category*

Canadian Members

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\$40.00 Professional

Full-time Keepers

☐

\$40.00 Affiliate

Other staff & volunteers

☐

\$40.00 Associate

*Those not connected with
an animal facility*

☐

**\$65.00 or up - Individuals
Contributing/Canada**

☐

\$125.00 or up

Institutional/Canada

*Organizations/Institutions
(requires Board approval)*

☐

Library Only

\$40.00 Library

*Available only to public
& university libraries*

Zoo Affiliation (if any) _____

Zoo Address _____

Title _____

Work Area _____

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My check is enclosed (AAZK, Inc.)

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MASTERCARD VISA Card # _____ - _____ - _____ - _____

Name on card _____ Expiration date _____

Signature _____

Mail this application to: AAZK Administrative Offices, 3601 S.W. 29th, Suite 133 Topeka, KS 66614-2054. Make checks/money orders payable to AAZK, Inc. Must be in U. S. FUNDS ONLY. Membership includes a subscription to *Animal Keepers' Forum*. The membership card is good for free admission to many zoos and aquariums in the U.S. and Canada.

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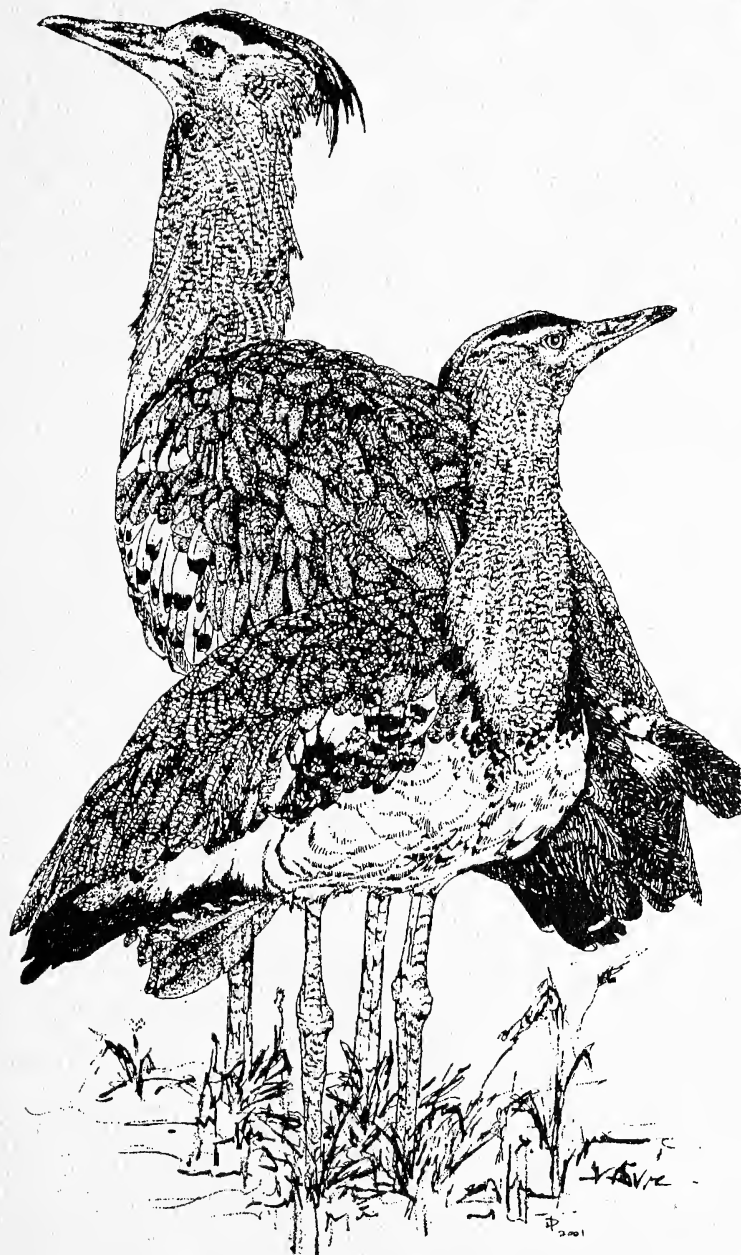


Animal Keepers' Fort
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1974 - 2004

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ANIMAL KEEPERS' FORUM



The Journal of the American
Association of Zoo Keepers, Inc.

DECEMBER 2005

AKF Managing Editor: Susan D. Chan • **Associate Editors** • Kayla Grams, Grand Junction, CO; Mark de Denus, Reid Park Zoo; Jolene Hamrick, Tucson, AZ • **Enrichment Options Coordinators:** Dawn Neptune, Utah's Hogle Zoo & Rachel Cantrell, Disney's Animal Kingdom • **Legislative/Conservation Outlook Column Coordinator:** Georgann B. Johnston, Sacramento, CA. • **ABC's Column Coordinator:** Diana Guerrero, Big Bear Lake, CA • **Reactions Column Coordinator:** William K. Baker, Jr., Little Rock Zoo

Animal Keepers' Forum is published monthly by the American Association of Zoo Keepers, Inc., 3601 S.W. 29th Street, Suite 133, Topeka, KS 66614-2054. Ten dollars of each membership fee goes toward the annual publication costs of Animal Keepers' Forum . Postage paid at Topeka, KS.

AAZK Executive Director: Ed Hansen, AAZK, Inc., Topeka KS
also serves as AAZK Liaison to the American Zoo & Aquarium Association (AZA)
AAZK Administrative Secretary: Barbara Manspeaker, AAZK, Inc., Topeka, KS

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AAZK PUBLICATIONS - CONTINUING DATA COLLECTION

Resources for Crisis Management in Zoos & Other Animal Care Facilities, Vol. 2 - Susan D. Chan, Topeka, KS;
William K. Baker, Little Rock Zoo, AR; Diana Guerrero, ArkAnimals, Big Bear Lake, CA



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30th Anniversary
1974 - 2004

About the Cover.....

This month's cover features a pair of Kori Bustards (*Adeotis kori*) drawn by Debi Talbott, a Keeper in the Bird House at the Smithsonian's National Zoological Park in Washington, DC. Weighing in at 24-42 lbs. (10-19kg), the Kori Bustard is one of the heaviest flying birds in the world. However, they are usually found on the ground, they are reluctant to fly unless serious danger threatens. They are native to the African continent where they are primarily found in arid savannah regions. They associate with herding animals on the grasslands of Western and Southern Africa, eating insects that are scared up as the herds move through. True omnivores, they also are known to eat small mammals, lizards, snakes, seeds, berries and other plantlife. Male Kori Bustards, actually bustards in general, are famous for their spectacular courtship displays. Raising the tail high over the back, standing straight up, and inflating his neck, the male will begin to "boom". A most impressive sight to be sure. Following copulation, the male moves on to find another female with which to breed. The female lays 1-2 eggs in a shallow scrape in the earth (no formal nest is made). The chicks, which are precocial, hatch in 23-24 days and are soon able to follow their mother about seeking food. Kori bustards become sexually mature at about two years of age. This species is listed on Appendix II of CITES. Thanks, Debi!

Animal Keepers' Forum publishes original papers and news items of interest to the animal keeping profession. Non-members are welcome to submit articles for consideration. Articles should be typed or hand-printed and double-spaced. Authors are encouraged to submit their manuscripts on a disk as well as in hard copy form. Manuscripts submitted either on disk or electronically as attachments to an email should be submitted in Microsoft WORD. All illustrations, graphs, charts and tables should be clearly marked, in final form and should fit in a page size **no greater than 5.5" x 8.5"** (14cm x 22cm). Literature used should be cited in the text (Brown, 1986) and alphabetically in the final bibliography. Avoid footnotes. Include scientific name (as per ISIS) the first time an animal name is used. Thereafter use common name. Use metric system for weights and measurements (standard equivalents may be noted in parenthesis). Use the continental dating system (day-month-year). Times should be listed as per the 24-hour clock (0800, 1630 hrs. etc.). Glossy black and white or color prints (minimum size 3" x 5" [8cm x 14cm]) are accepted. Clearly marked captions should accompany photos. Please list photo credit on back of photo. Photographs may be submitted electronically as either JPEG or TIFF file attachments.

Articles sent to *Animal Keepers' Forum* will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for *AKE*. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the editor. The editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or email contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone 1-800-242-4519 (US); 1-800-468-1966 (Canada); FAX (785) 273-1980; email is akfeditor@zk.kscoxmail.com

**Deadline for each regular issue is the 10th of the preceding month.
Dedicated issues may have separate deadline dates and will be noted by the editor.**

Articles printed do not necessarily reflect the opinions of the *AKE* staff or the American Association of Zoo Keepers, Inc. Publication does not indicate endorsement by the Association.

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E-Mail Addresses: You may reach Barbara Manspeaker at AAZK Administrative Offices at: aazkoffice@zk.kscoxmail.com You may reach Susan Chan and *Animal Keepers' Forum* at: akfeditor@zk.kscoxmail.com

AAZK website Address: www.aazk.org

BFR Website: <http://aazkbfr.org>

Scoops & Scuttlebutt



Chapter Recharter Packets in the Mail Soon

All AAZK chapter are reminded that 2006 Recharter Packets will go in the mail the first week in January. They are sent to each chapter President at the address listed on last year's Recharter form. Completed packets are due back at the AAZK Administrative Office no later than 1 March 2006. The late fee for 2006 is \$150.00, so make every effort to get your packets in by deadline. Be sure to fill out the packets completely, providing all of the requested information, including a copy of your 2005 closing bank statement. Completion of the recharter packets by all AAZK Chapters is an IRS requirement to allow AAZK, Inc. and its subsidiaries to operate under our nonprofit 501(c)(3) designation. If you have questions about filling out the packet, please contact Barbara Manspeaker at 1-800-242-4519 (U.S. or 1-800-468-1966 (Canada). Your cooperation and prompt response is greatly appreciated!

AAZK Seeks Better Ways to Communicate With the Membership

In order to better communicate with our members, and also save the Association the rising costs of mailing documents and postage, we are wanting to establish an AAZK member e-mail database. With such a database we would be able to send out electronic membership renewal notices, information about upcoming conferences, and other Association news. In order to make this work, we need your help. Please send an email to Barbara Manspeaker at aazkoffice@zk.kscoxmail.com with the words "AAZK Email Database" in the subject line. Please be assured that your email address will not be shared with any other group or individual without your express permission. We are simply looking for ways to stay in touch with you as a member and to also help cut the costs of mailings and postage for the organization. Thanks in advance for helping us achieve this goal.

AAZK Gets Financial Support from Cleveland Chapter

The AAZK Board of Directors and the Administrative Office staff would like to thank the members of the Cleveland AAZK Chapter for their generous donation of \$1,000.00 to the general operating fund of the Association. Because AAZK is indeed a business, we encounter all the expenses of other businesses--everything from paying office space rent to buying copy paper, from providing an 800 phone number for members to printing the *AKF*. Financial support from our Chapters is very important in helping to meet these necessary expenditures. Thank you Cleveland AAZK!

Committee Members Wanted

Would you like to help AAZK on a National level? The Marketing Committee is looking for additional committee members. Some of our projects for the next year include:

- Product line development
- Sponsorship/ Donation Program
- Partnerships with other organizations
- Membership Drives
- Membership Retention Program

Please contact Kristen Wolfe at kristen.wolfe@disney.com if you are interested. Include a brief reason for interest and your past AAZK involvement

ICZ Seeks New Logo - Contest Information - Deadline 30 January 2006

The International Congress of Zookeepers (ICZ) is seeking a new logo. This logo will be used on all ICZ related items such as letterhead, T-shirts and conference satchels, as well as the website and all future merchandise marketed by the ICZ.

To submit a logo for consideration, please follow these guidelines:

- must incorporate the letters "ICZ" in the design
- should be easily reproducible
- should represent zookeeping on a global level
- preferably limit to 2 colors; if you choose to include color send both a color and a black and white version

If you would like to have your design considered as the new logo, please send a **high resolution .jpg** file to: Norah.Farnham@zoo.org Or you may send a hard copy to: Norah Farnham, c/o Woodland Park Zoo, 601 N. 59th St., Seattle WA 98103 USA.

Entries are due by 30 January 2006. The five (5) finalists, selected by the ICZ Steering Committee, will be notified by 1 April 2006 that their design is to appear on the 'ballot' at the congress in Australia. At the second International Congress, which will be held May 7-11, 2006 in Gold Coast, Queensland, Australia, the delegates in attendance will be given the opportunity to cast their votes and choose the winning logo. The winning logo will be chosen and announced at that time.

Mission Statement: "The ICZ (International Congress of Zookeeping) will build a worldwide network among zookeepers and other professionals in the field of wildlife care and conservation. This exchange of experience and knowledge will improve the professionalism of zookeepers for the benefit of the animals under their care and promote awareness and actions that will contribute to the preservation of wildlife everywhere".

To learn more about the ICZ, please visit our website at www.iczoo.org

Call for Submissions for Enrichment Options Column

Enrichment Options readers - WE NEED YOU!! We are looking for any and all articles that discuss enrichment processes and philosophies as well as device articles. We are, however, looking for device articles to discuss not only the construction of the device but also the goals, behaviors to be encouraged, process of documentation and findings upon evaluation. We also want to know about the programs, processes and philosophies at your institution and how they work for you.

But here comes the critical piece to this equation. We need you, our readers, because you are our most important contributors. We need you to submit articles for publication because the column simply cannot exist without you. We want to share information with institutions all over the world, but we can't do it without your submissions. We want to hear about how the enrichment process works for your facility. We want to know about specific enrichment devices that are working for your animals. We want to hear your creative perspectives on all things enrichment!

Submissions may be sent in hard copy (also include a disk or CD) to: Enrichment Options, AAZK, Inc., 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054. Or you may submit material electronically to akfeditor@zk.kscoxmail.com. Please send photos, graphs or charts as separate jpg or tif files. Make sure to provide captions and photo credits. Manuscripts should be sent in MS Word format only. Please provide your contact information, including email and daytime phone number.

We hope to hear from YOU soon! Thank you in advance for your contributions! - *Enrichment Options* Co-editors Rachel Cantrell, Disney's Animal Kingdom and Dawn Neptune, Utah's Hogle Zoo.

Conference 2006 Opens Website

AAZK will be heading to Chicago in the fall of 2006 for its National Conference. It is being hosted by the Lincoln Park AAZK Chapter and the Lincoln Park Zoo. They now have a website up and will be adding information on the upcoming conference as it becomes available. The website address is www.aazk2006.org< There is also a link to this site from the main AAZK website (www.aazk.org).

Check Out the Insert to Get Your New AAZK Logo Apparel

Be sure to check out the insert in this issue of the *Forum* for information and an order form for the new AAZK logo T-shirts. Plan to wear your AAZK pride in 2006!

Letter to the New Orleans Delegates



Dear Delegates,

It is hard to believe that 2 1/2 months ago our great city of New Orleans was suppose to be the site of the 32nd National AAZK Conference. Around this same time last year, the Audubon Nature Institute hosted the 2004 AZA conference with Hurricane Ivan as an unregistered attendee. Fortunately for New Orleans and the Audubon Nature Institute, the storm veered east and the conference continued on full speed ahead.

Little did our New Orleans AAZK Chapter know that one year later we too would have a hurricane threatening our conference. Hurricane Katrina, a Category 5 storm, seemed to creep up on New Orleans, but our Chapter was hopeful that we would once again be spared a direct hit and that our conference would continue on as planned. However, much to all of our disappointment, the conference had to be cancelled due to the severity and uncertainty of Katrina. Our Chapter wished all of you could have "Brought out your wild side New Orleans style."

To all the individuals who came to New Orleans and evacuated with our staff, thank you for your patience, uplifting spirits, and for your commitment to get through this tragic event.

To all the Chapters who donated to our facility, words cannot express our gratitude. The first few weeks after the storm were very difficult, but through all the encouragement and donations our facilities stayed strong. We have all been affected in some way by Hurricane Katrina. The last few months have been devastating and uplifting, emotional and unfathomable. This event has shown the worst and the best in people, and I am fortunate to have witnessed the best. You truly do not understand the generosity of people until you experience such a life-changing event. It makes you want to "pay it forward". We have all pressed our limits, but we continue to strive to do better and to take back our lives.

Our New Orleans AAZK Chapter can't wait to reunite with everyone at the 2006 conference hosted by the Lincoln Park Zoo Chapter. AAZK, Inc is in the process of contacting individuals about conference refunds (see notice below). Until then, if anyone has any questions please feel free to email me at jhocean@hotmail.com. We will see you in the windy city but let's hope it is not as windy as Katrina!

Best Wishes,

Jaime Hayslette, President of New Orleans AAZK Chapter/Primate Keeper

Refund Notice for Conference Delegates

The AAZK Board of Directors is working with the Audubon AAZK Chapter and their Conference Committee to facilitate refunds to full registration delegates to the 2005 AAZK National Conference in New Orleans that was cancelled due to Hurricane Katrina.

Delegates are asked to contact AAZK Executive Director Ed Hansen by sending an email to aazkoffice@zk.kscoxmail.com. You may also send an email directly to Ed through the AAZK website (www.aazk.org) by going to the Board of Directors listing on the menu bar on the left side of the AAZK Homepage. In the subject line, please put the words "AAZK Registration Refund". You will receive a return email with information about options in the registration refund process.

If you do not have email access, you will be contacted by regular mail within 60 days of this notice with information on refund policies.



From the Executive Director

Five things we need to change in 2006:

- Business practices
- Communication
- Partnership
- Membership
- Association value

AAZK needs to change. My function in this Association is to operate AAZK as a business. To equate the business to something you will all understand, it's like hosing debris to a drain the architect strategically placed at the highest point. AAZK is always pushing uphill to publish our magazine and fund our Committees, Grants and pay the bills. But, the reality is we only have so much "hose pressure" or income to meet the demand. We've got some ideas and we always need more ideas.

AAZK is a poor communicator. I promise you we will change that fact in 2006. We are developing communication strategies to help us communicate more effectively with our Chapters and our individual members.

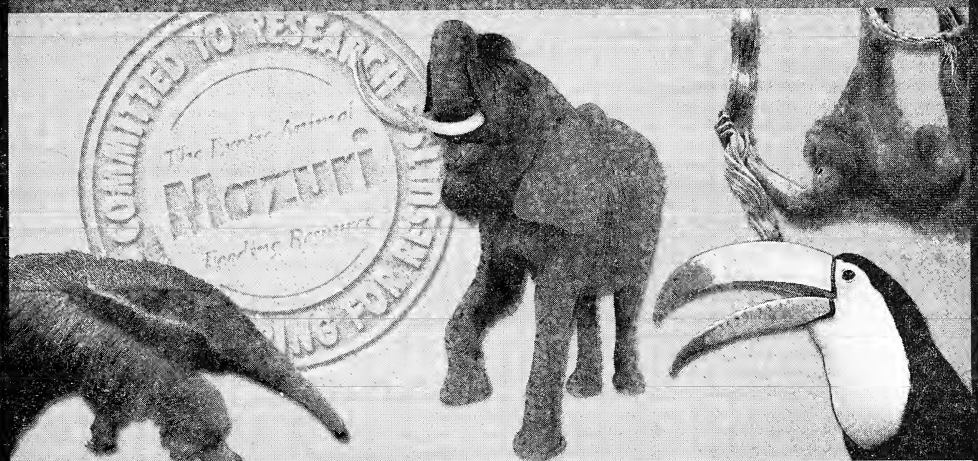
In order to continue meeting the goals of this Association, AAZK will need to develop a financial partnership with every Chapter in our Association. This means we involve you in the decision-making process and give you ownership of the issues that confront the operation of this business.

We must recruit additional members into the Association. We will be working with the Chapters and facilities to improve our membership across the board. On average, only about 20% of the keepers that work at your facility are AAZK members, and less than 15% of AZA-accredited facilities are AAZK Institutional members.

We need to change all of the above to increase the value of the Association to members, potential members and to the animal care profession. We will tweak the content of the *Animal Keepers' Forum* and make improvements to the Web Site. If you have not visited the Web Page (www.aazk.org) and signed up on the Communication Forum, you are already missing an opportunity to improve your professional growth

And finally, the cancellation of the 2005 Conference in New Orleans has dealt this Association a severe financial and emotional blow. We annually count on income from our conference to fund approximately 20% of our operating expenses, and a majority of this income has literally been blown away. As a result, we are once again in crisis. Chapters and members – once again, I'm calling on you to step up now and make a donation to the Association that will help offset the income lost when the conference was lost. Any amount will help, and get us through into early 2006, when we can implement a partnership strategy, together.

Ed Hansen
AAZK Executive Director



DIETS AS DIVERSE AS THE ANIMAL KINGDOM

Working in partnership with zoos and aquariums, MAZURI® PhD nutritionists develop industry leading products specifically for each species. From armadillos to zebras, we work hard to give your animals the most of what they need.

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Coming Events

Third International Tapir Symposium - 26-31 January 2006 in Buenos Aires, Argentina. For info email tapirtalk@uol.com.br

14th Annual Conference of The International Association of Avian Trainers and Educators (IAATE) - 15-18 February 2006 in Nashville, TN. This year's theme is "Soaring to New Heights". The conference is being hosted by the Nashville Zoo at Grassmere, at the Nashville Sheraton Downtown Hotel. For further information, please visit www.iaate.org. You can also contact Alicia Douglas (aliciadouglas78@yahoo.com) or Jacqueline Walker (jwalker@nashvillezoo.org).

Animal Behavior Management Alliance Conference - 5-10 March, 2006 in San Diego, CA. Hosted by the Zoological Society of San Diego and Sea World/California. The theme is "Behavioral Buffet" and conference will include site visits, workshops, paper and poster presentations and a job fair. For more info on the ABMA and the conference log on to www.theabma.org

AZA Eastern Regional Conference - 26 March - 1 April 2006 - hosted by the Jacksonville Zoo, Jacksonville, FL. See <http://www.aza.org/ConfWork/AboutRegWork/#fut>

AZA Western Regional Conference - 24-29 April 2006 hosted by Vancouver Aquarium in Vancouver, British Columbia. See <http://www.aza.org/ConfWork/AboutRegWork/#fut>

Second International Congress of Zookeeping (ICZ) 7-11 May 2006 in Gold Coast, Queensland, Australia. Visit website: <http://www.iczoo.org> for latest information.

2006 International Gorilla Workshop - 23-26 June 2006 at Paignton Zoo, Devon, England. Paignton Zoo will be host. We would like to invite gorilla workers from all disciplines to register. Deadline for submission of abstracts for presentation and for early registration is **31 December 2005**. Further info available at <http://www.paigntonzoo.org.uk/gorillas/gorillaworkshop.htm>

21st Congress of the International Primatological Society - 26-30 June 2006 in Entebbe, Uganda. For further info: wolupot@yahoo.com

First European Congress of Conservation Biology - 23-27 August 2006. Please visit <http://www.eccb2006.org> for details and to register for new information.

33rd AAZK National Conference - 15-20 September 2006. Hosted by the Lincoln Park Zoo AAZK Chapter and the Lincoln Park Zoo, Chicago, IL. See information at their website www.azk2006.org

AZA Annual Conference - 25 - 30 September 2006. Hosted by Busch Gardens, Florida Aquarium, & Lowry Park Zoo, Tampa, FL. See information at their website <http://www.aza.org/ConfWork/AboutAnnualConf/#fut>

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AAZK Announces New Members

Kristen Clark, Erin Bishop and Marie Magnuson, **Smithsonian's National Zoological Park (D.C.)**; Nadia Gordon and John Andrews, **Jacksonville Zoological Gardens (FL)**; Jessica Lippett, no zoo listed, **Miami, FL**; Gina Rivera-Kadish, no zoo listed, **Tampa, FL**; Leane A. Gagliardi and Karen Jasmin, **Disney's Animal Kingdom (FL)**; Kevin Scotti, **Akron Zoo (OH)**; Patricia Miles, no zoo listed, **Dearborn, MI**; Melissa Lincoln, **Potter Park Zoo (MI)**; Caty Poggenburg, **Milwaukee County Zoo (WI)**; Vanessa Stoffel, **Bear Country USA (SD)**; Rick Bohn, no zoo listed, **Evanston, IL**; Maureen Leahy and Betty Green, **Brookfield Zoo (IL)**; Margaret Zambrano, **Tulsa Zoo & Living Museum (OK)**; Kelli Parker, no zoo listed, **Houston, TX**; Michelle Triplett, **The Phoenix Zoo (AZ)**; Anna Oblasser, **America's Teaching Zoo (CA)**; Kaye Banyard, **Folsom City Zoo (CA)**; Patricia Morin, **Cochrane Polar Bear Habitat (Ontario)**; and David LaBelle, **Birds & Animals Unlimited (Canada)**.

Renewing Institutional Members

Dickerson Park Zoo, Springfield, MO
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Ralph E. Waterhouse, Director

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Jay R. Christie, President/CEO
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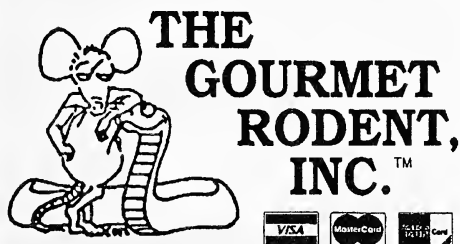
Frog Secretions Block HIV Infections

A new weapon in the battle against HIV may come from an unusual source – tropical frogs. Investigators at Vanderbilt University Medical Center have discovered that compounds secreted by frog skin are potent blockers of HIV infection.

The findings, reported in the *Journal of Virology*, could lead to topical treatments for preventing HIV transmission and reinforce the value of preserving the Earth's biodiversity.

"We need to protect these species long enough for us to understand their medicinal cabinet," says Louise A. Rollins-Smith, associate professor of microbiology & immunology, who has been studying the antimicrobial defenses of frogs for about six years. Frogs, she explains, have specialized granular glands in the skin that produce and store packets of peptides, small protein-like molecules. In response to skin injury or alarm, the frog secretes large amounts of these antimicrobial peptides onto the surface of the skin to combat pathogens like bacteria, fungi and viruses.

The investigators recently learned that the American Foundation for AIDS Research will fund their continuing quest to understand how the frog peptides kill HIV in dendritic cells. Their plans include imaging how the peptides work, screening additional frog peptides for activity, and testing peptides on a mucosal cell system to study the feasibility of developing them as prophylactics against HIV infection. *Source: The Center for North American Herpetology, Lawrence, KS*
<http://www.cnah.org>



RATS AND MICE

Bill & Marcia Brant

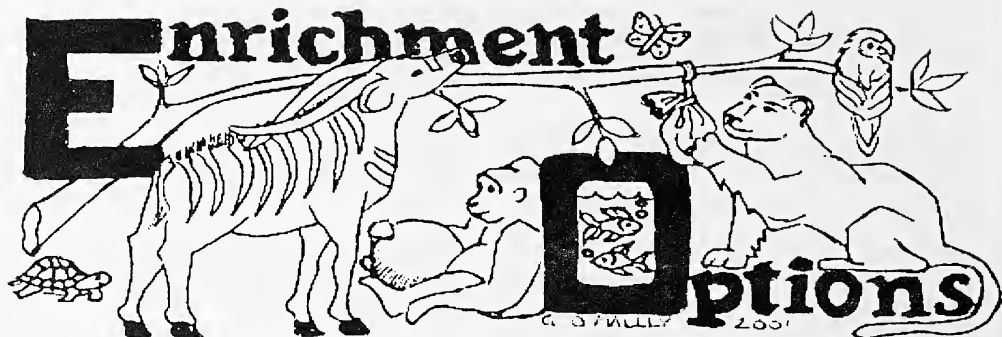
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EO Editors - Dawn Neptune, Utah's Hogle Zoo
and Rachel Cantrell, Disney's Animal Kingdom

"Mirror Ball" An Intern Project at The Oakland Zoo

By Sharon Dichiaro, Intern;
Photos by Erica Calcagno, Keeper III
Oakland zoo, Oakland, CA

My assignment during my internship at The Oakland Zoo, Oakland, California, was to create an enrichment device for our two tigers (*Panthera tigris*), Suma and Torako. My previous experience with enrichment design pertained mainly to primates, specifically Japanese macaques (*Macaca fuscata*). One of the most successful enrichment designs with the troop involved pasting a mirror to the inside base of a bucket. Upon seeing their reflections, the females showed great interest and curiosity while the male promptly became aggressive and territorial. Of the tigers' existing enrichment I noted that the large Boomer Ball® was overwhelmingly their favorite. I combined my observations and experience with these two very different species to create the "Mirror Ball".

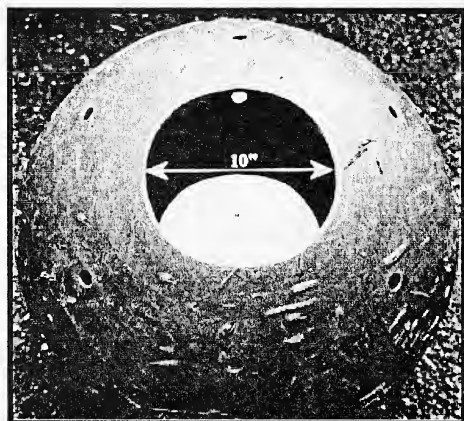


Figure 1 - Mirror Ball



Figure 2 - Midline cut with bolts from tabs

The Construction Process

I focused my design around a 2 ft. diameter Boomer Ball® (20" JUNGLE BALL, weighs 25lbs, side wall thickness of about 1/4"). A 10" diameter hole was cut out of one side of the ball, large enough to allow a paw to be safely inserted but small enough to prevent an entire head from entering and

becoming stuck inside the cutout. I cut the ball in half along its midline (the cut for the 10" hole runs parallel to this line). A mirror-polished piece of stainless steel, cut into a circle with extending tabs (the diameter was approximately 1.5'), fit somewhere between the 10" diameter hole and the midline cut. By bending and drilling the extended tabs we were able to bolt the mirror to the sides of the ball creating a very strong unmovable surface which would not yield to any pressure exerted by the tigers. To add an extra effect, we tapped a weight — in our case, a chunk of steel — and screwed it into the bottom of the hemisphere that did not have the 10" hole. This weight in the ball would produce a weeble-wobble movement, creating an interactive and unpredictable toy.



Figure 3 - Weighted bottom with drain holes and handle.

Then 1/2" holes were drilled close to one another through which a rope was run and interiorly tied, creating a handle to carry the somewhat awkward toy. Again the rope loop was big enough for a human hand, but not large enough for either tiger to get a paw stuck. For the final touches, additional 3/8" holes were drilled around the weight to allow water to drain out (if dragged into our pools) and around the 10" hole to allow light in when a curious face filled this space. We reassembled the halves by using more two-hole drilled steel tabs. With the tabs running perpendicular to the midline, we bolted them to both sides of the hemisphere.

Overall, the toy was a huge success and could be appropriate (with minor changes for safety and size) for a variety of taxa. I hope your animals and keepers enjoy interacting with the "Mirror Ball" as much as our tigers did.



Figure 4 - Looking!

Figure 5 - A closer look

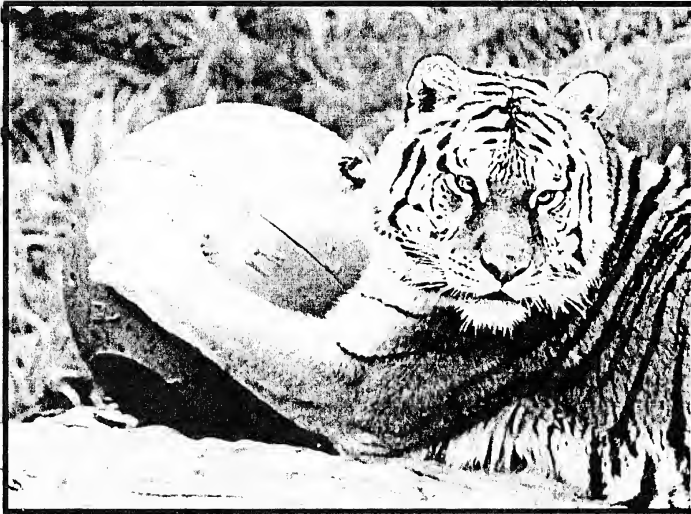
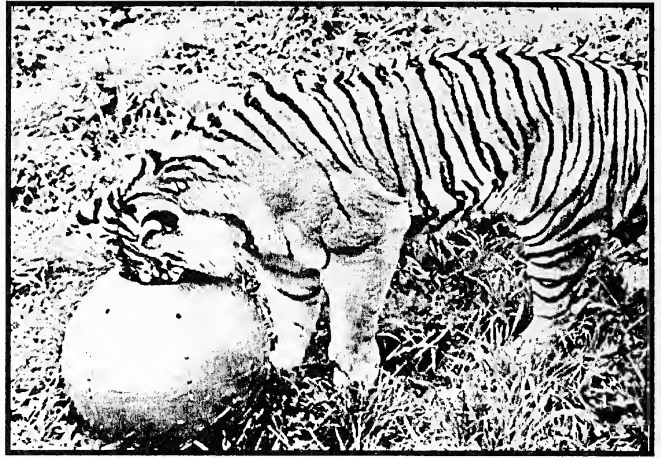
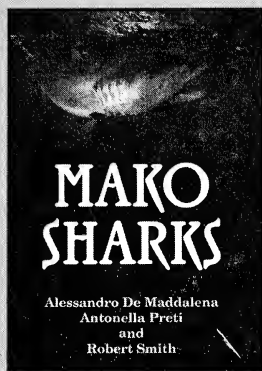


Figure 6 - Torako with "Mirror Ball"

Ideas appearing in this column have not necessarily been tested by the editors for safety considerations. Always think ahead and use good judgement when trying new ideas. You are invited to submit material for the Enrichment Options Column. Look in the January 2004 issue of AKF for guidelines for articles acceptable for this column's format or contact the editor at akfeditor@zk.kscoxmail.com for a copy of the guidelines. Drawings and photos of enrichment are encouraged. Send to: AKF/Enrichment, 3601 SW 29th St., Suite 133, Topeka, KS 66614-2054, USA. Eds.)



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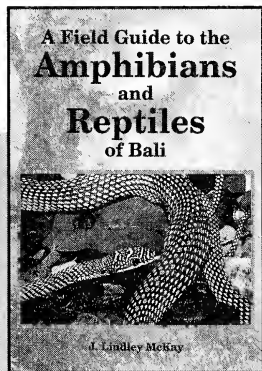
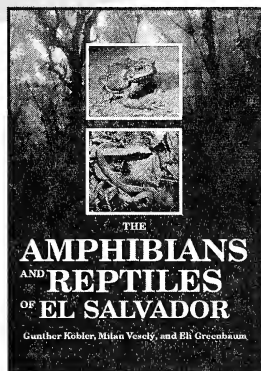
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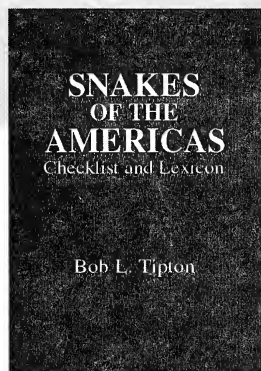
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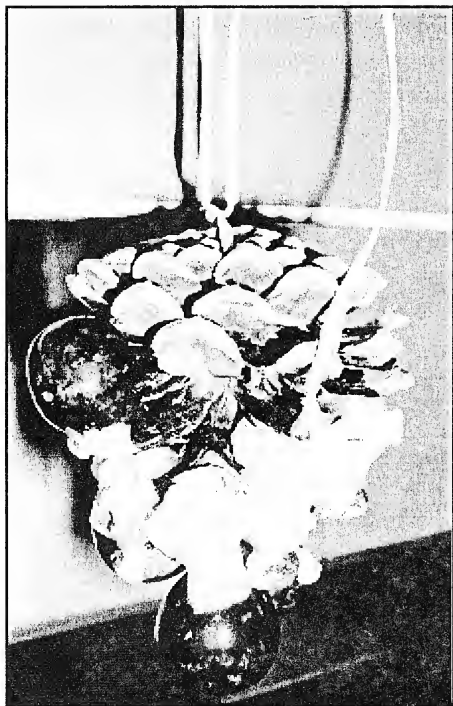
My Animal Unit Internship: The Positive Role of Interns in Animal Units

By

*Ilana Rosenberg, Animal Unit Intern with the Tropical Rain Forest/Zoo Corps Intern
Supervisor: Lead Keeper, Stephanie Forbes
Woodland Park Zoo, Seattle, WA*

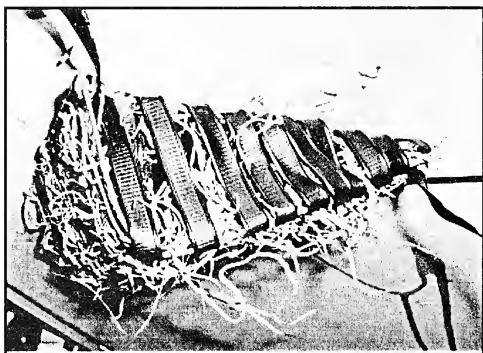
As a teen volunteer intern with Woodland Park Zoo's Tropical Rain Forest exhibit, I followed a project of my own design which allowed me to work closely with two Goeldi's monkeys (*Camillio Goeldi*) and two troupials (*Icterus icterus*) all of which are in holding. Being a 17-year-old senior in high school, my project took place with Stephanie Forbes, Lead Keeper, as my mentor. Ethograms, data sheets, enrichment evaluation sheets were designed, enrichment implemented for both species, and a puzzle feeder for the Goeldi's. Some enrichment that was tried for both species is described below.

Two of the enrichment items tried with the troupials that were successful in promoting foraging behavior were pinecones stuffed with chopped fruit and grapes and mealworm popsicles. The troupials had to maneuver to reach the hanging pinecones, as well as peck at the crevices to extract the reward.



Hanging Pinecone Feeder

Mealworm popsicles were effective in warm temperatures, above 65°F. Hung in hard-to-reach places, the troupials had to maneuver and constantly try new positions and perches to reach the scattered popsicles. As they melted, new mealworms were revealed, resulting in long-lasting food dispersal. Finally, an enlarged, triangular version of a suet feeder was made to promote nesting behaviors.



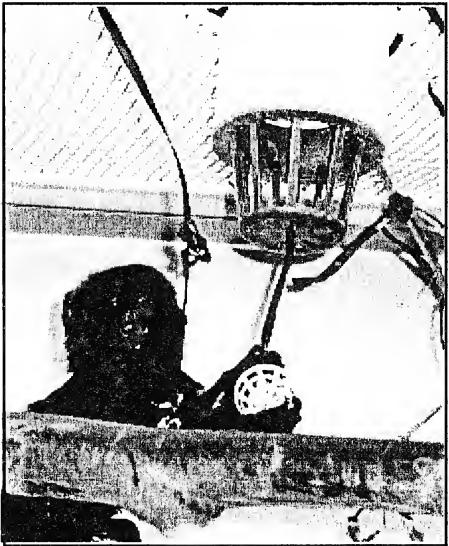
Spanish Moss Suet Feeder

Filled with nesting substrate, the item not only provided a new element to outside holding, but also challenged the birds to pull out the material from a relatively compact holding. The day observed, the birds did not interact very much because there were eagles flying overhead, as well as seagull and crow vocalizations. Later on however, the enrichment item showed signs of use; large amounts of Spanish moss had been pulled through the openings. Though this did not promote nesting, it did result in object manipulation, problem-solving, and a high effort level since the moss was densely packed.

Various enrichment items were introduced to the Goeldi's monkeys, including diluted grape juice popsicles that were a novel dietary item and required a different method of consumption than normal diet, as well as various forage feeders. Also, as an intern, I designed an original enrichment item for the Goeldi's monkeys. A puzzle feeder was made from piping materials that presented food in a novel way, requiring problem solving and making connections between an action and the food reward. This item was made to increase the complexity of feeding and promote the natural foraging behavior in the monkeys. My internship contributed an item that proved successful when tested on a young male Goeldi's monkey. This puzzle feeder was highly praised by the keepers within the exhibit, and will continue to be used.



At top left, 1.0 Goeldi's monkey "Harlee" checks out the puzzle feeder designed to encourage foraging and problem-solving skills



At right 1.0 Goeldi's monkey "Harlee" pulling on ball to release the treats hidden in the puzzle feeder.



At bottom left, 1.0 Goeldi's monkey "Harlee" retrieves food treats from the puzzle feeder basket.

(All hotos provided by the author)

High school interns such as myself can be a constructive and helpful element in any exhibit area. Research interns are able to focus on one or a few target animals. This high level of attention, documentation, and commitment can greatly improve the welfare of the study animals. Even though enrichment is such an important part of the lives of animals at zoos, there is not always enough staff, time, or resources to ensure regular enrichment for all animals. By recruiting interns, animals can receive individualized attention and careful behavior documentation with new enrichment options. Not only that, having interns will bring fresh ideas to the workplace, ease the workload of keepers, and ensure that keepers are well informed of any changes, positive or negative, in an animal's behavior. It is time to welcome research and enrichment based interns into zoos. Youth like myself who share a



Cat Brush for Self-Grooming Behavior

passion for working with animals and researching them should not be exempt from lending their help and ideas because of their ages' stereotypes. Thanks to my internship, I know that I want to help conserve endangered animals by studying animal reproductive technology in college. So many other adolescents who share similar passions are waiting to be welcomed into zoo communities, beyond visitor assistance. All of these people represent ideas, innovative enrichment, great careers, and the future of zoos and animal conservation waiting to be discovered.

New Training Opportunity! Registration Deadline is 15 January 2006

Techniques for Butterfly Conservation & Management
24-26 April 2006

Hosted by the McGuire Center for Lepidoptera & Biodiversity, Gainesville, FL

Course topics will include: natural history and identification, captive propagation, host plant care & needs, field/lab research techniques, permitting/recovery planning basics, population monitoring, habitat restoration, butterfly exhibitry, education and outreach, partnership building

Course participants will include: zoo/aquarium/nature center staff and volunteers, government wildlife biologists, university researchers, other individuals interested in butterfly recovery and conservation

Instructors include: Dr. Tom Emmel, UFL; Dr. Jaret Daniels, UFL; Mark Deering, Butterfly House; Mitch Magdich, Toledo Zoo; Erin Sullivan, Woodland Park Zoo; Dr. Peter Tolson, Toledo Zoo; Ruth Allard, AZA.

For more details (including costs and travel info) and/or to register for this course, please visit www.aza.org/prodev/ButterflyCon/ or contact AZA Training Administrator Geri Noland at azatraining@aza.org or call 301-562-0777 ext.238.

Registration Deadline is 15 January 2006!

This course is offered in conjunction with the
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ALL PROCEEDS GO TO AAZK NATIONAL

REACTIONS

A Question and Answer Forum for the Zoo Professional on Crisis Management

By William K. Baker, Jr., Curator
Panthera Research, Maumelle, AR



Question

With all of the advances in crisis management, why do escapes and emergencies still occur?

Comments

There are numerous philosophical approaches to this question, but I'll take the straight forward approach to answering it. I should preface my answer that to address this issue, not unlike last month's question on preparedness, my answer will be somewhat philosophical as well as subjective in nature; basically, my professional opinion. First and foremost, crisis management is about human nature. Now before people raise eyebrows, let me explain. It is human nature to be imperfect. Essentially everyone makes mistakes in some form or fashion as they move through life. Now, some people make more than their fair share of mistakes and others make fewer errors in judgment, while some people make catastrophic mistakes some individuals make dismissible errors. Forgetting to secure a cage door versus forgetting your feed bowls. Point is...everyone sooner or later makes a mistake, even me.

Now the argument could be made, aha...what about failure of a critical service, machine, or structure? Same argument still applies; human nature is to make mistakes. If a critical service fails, it probably should have been addressed before it became a problem, say through a design or inspection process. If a machine fails, same thing applies, inspect regularly, and repair before it becomes a problem. Most people change the oil in their cars or get tune-ups for this very reason. Okay, what about a structural failure? Once again we have engineers and architects to design our buildings and inspectors who oversight the construction and maintenance process. Design flaws aren't good excuses.

Okay now comes the devil's advocate standpoint on all of the above. Everything fails sooner or later, yes? That's right, but remember forewarned is forearmed. As I have said before, "Prepare for the worst and hope for the best". Now, leaving that discussion to the side, there are three other reasons that I believe crisis events occur. One, crisis management in zoological institutions is a relatively new science, probably less than 20 years old; we're still learning everyday. Two, we live in the information age. When I started in the profession people didn't discuss escapes, etc. It just wasn't done and it stayed in-house. In today's information highway, we don't really have a choice, sooner or later it gets out. So, in my opinion, we hear about it more than we used to in years past, not to mention there are more zoos. Three, the random factor exists known as the visitor. You can prepare for virtually any situation, but the visitor in many cases results in new variants on any existing plan. Still, all of the above aside, I truly believe that zoos, refuges, and sanctuaries are all doing much better than in years past. Our industry is getting safer everyday.

Question

What non-lethal recommendations are there for handling animals in a crisis?

The most common form of non-lethal response for a dangerous animal crisis is chemical restraint. This may take the form of rifles or pistols, CO₂ or explosive charge, or even the basic blowpipe and jab stick. The basic tenants of this approach remain unchanged, effectively you are attempting to

chemically restrain and immobilize an exotic animal. There are numerous companies that manufacture quality projectile launchers. The most notable examples of this would be Telinject®, Daninject®, and Pneu-dart®. As to which company or projector to use, it depends on your specific collection needs and your annual budget. All three companies produce quality products.

Nets are still a daily staple of zoo operations. Not unlike projectors, it all depends on what your needs are in terms of species and collection diversity. Numerous companies produce nets both as custom and prefabricated products. A new product that has caught hold in the past decade is OC pepper spray. It is available in three basic configurations: stream, spray, and fogger. Having interviewed zoological professionals and personally used this product in crisis situations, I can vouch for its effectiveness. When used appropriately in a high concentration fogger style, it can remedy a situation in seconds. Counter-assault® manufactures a complete line of products that has been field tested and is marketed to the wildlife and zoological industry.

Water hoses and high pressure hoses can be effective in certain situations providing an opportunity exists to diffuse and redirect animals to night housing when fights break out on exhibit or during introductions. Typically this method requires two hoses to be truly effective in diffusing a situation. At nighttime intense light can be a powerful tool in terms of confusing an animal. Many exotic species have a tendency to freeze when spotlighted. While a flashlight can be moderately effective against smaller species, ideally what I am referring to is halogen or xenon-based lamps that are pushing 100,000 candlepower or better. Hunters, law enforcement, and scuba divers often use these. Noted manufacturers of this type of product would be Brinkman®, Q-Beam®, Pelican®, and Underwater Kinetics®.

Another way to disorient or diffuse a situation is to use fire extinguishers such as CO₂ or water-based units. However, ABC dry chemical units would not be an appropriate choice unless it was a life or death situation. Noise can be an effective stimulus in certain circumstances, such as whistles. While the more common pea-whistle is somewhat noisy, the better choice would be a thunder or lifeboat whistle, which can be heard for several miles. Another option is to use compressed air horns used for boating or sporting events. These come in a multitude of sizes and are readily available at any sporting goods store. Failing all of the above, you could even resort to using trashcan lids if that was all that was handy at the time of the event.

Sometimes the simplest tools are the best such as shields, barriers, sorting poles, and baffle boards, which can be truly effective when used as a method of directed movement. Experience will dictate which application is appropriate for a species. While effective with hoofed mammals, it would be a really bad idea to attempt directed movement with leopards that could easily jump the barrier.

The key is to be flexible and adapt to the situation. Use different combinations for best effect; say dart projectors and lights for a crisis at night to achieve a resolution.

Next Month: We are refining our dive operations policy. Do you have any suggestions?

If you would like to submit a question for this column or have comments on previously published materials, please send them to AAZK, Inc., 3601 S.W. 29th St., Suite 133, Topeka, KS 66614 Attn: Reactions/AKF

(About the Author: Since 1985 Bill has been active in the fields of science, zoology, and wildlife management. His education and experience include a B.S. in wildlife management and post-graduate studies in zoology, Lab and Museum Assistant, Shoot Team Leader, ERT Member, Large Mammal Keeper, Senior Keeper, and Zoo Curator at various zoological facilities. His area of research is crisis management in zoological institutions, which draws upon practical experience and training as a Rescue Diver, Hunter Safety Instructor, NRA Firearms Instructor, and Red Cross CPR/First Aid Instructor.)

ABC's

ABC's: Animal Behavior Concerns and Solutions

A Question & Answer Forum for Animal Professionals

©2005 by Diana Guerrero, Independent Behavior Consultant
Ark Animals of California, Big Bear Lake, CA



Question

We are working at our first attempt at training a camel. Can you give us some guidelines and talk about how to address the friskiness?

Answer

Last month I discussed some points that I thought were important for successful camel training and safety. I am going to review and outline seven points here and include some camel training resources.

Halter Training Tips

Take it slow and develop a good trusting relationship. You will want the animal to be familiar with your smell, presence, and manipulation. Favorite treats and activities can help achieve this quickly. You will then want to train the animal to accept a halter and lead. Let her see the halter when you give a favorite food, place the halter in the food bucket, touch the halter to the animal's face, etc. This can be trained much like you would a weanling or yearling horse. You might use a neck rope first if you are more comfortable with that.

Change Environments & Teach Manners

Expose the youngster to strange noises, objects, dress, and other things in a safe environment to condition low intensity toleration. Make sure you also include touch toleration. Include husbandry care such as examination, brushing, etc. Later, after you have trained the animal to lead, you can desensitize to other objects and events by venturing outside of their environment. If you have a good solid rapport they will be less likely to bolt. Teach consistent commands, conditioned reinforcers, and release words.

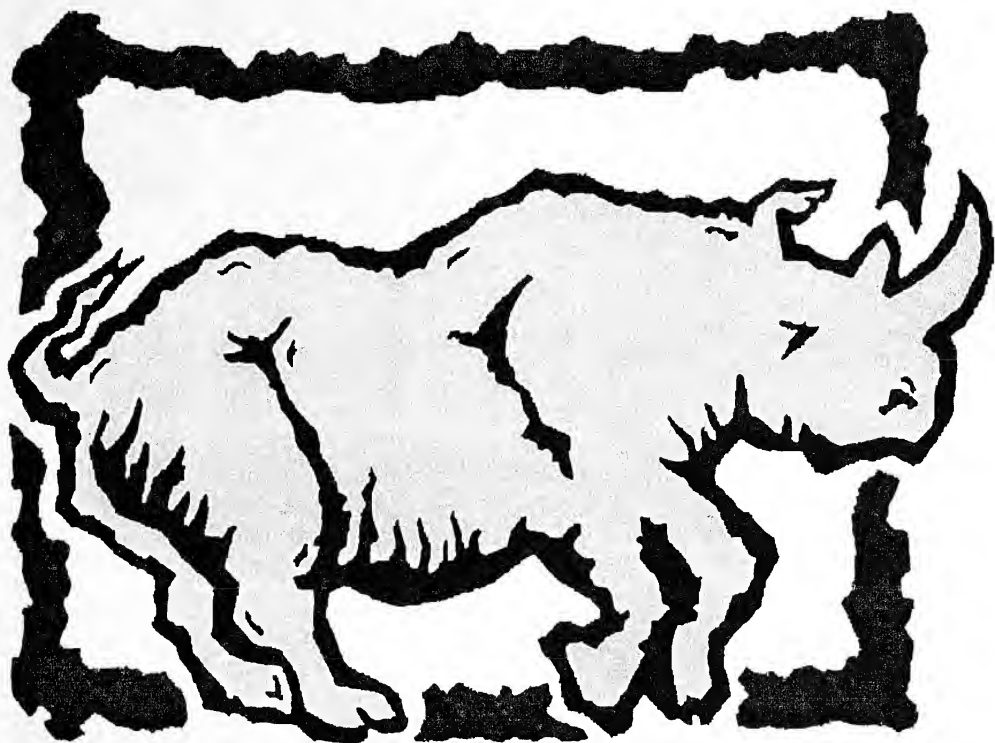
Avoid Future Issues

You won't want pen-sour or herd-bound animals so early in your work it is also important to teach the animals to separate out from one another. This can include exit and entry through gates, stables, and can eventually include loading and unloading behaviors for transport. "A to B" work and stationing are other terms for some of these behaviors. Having a background with equine training can be helpful since traditional handling methods have been used successfully with camelids.

Lead Training

Training to yield to the line is next. You will then want to consider riding a horse while training the camel to lead. This gives you a height advantage, some protection should the animal decide to bounce, kick, or use the neck, and also gives you better leverage. Many hoofed animals are less likely to resist if they are following another animal. Teach this behavior instead of taking the animal out on foot and before you teach the push (down).

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Teaching "cush"

There are a number of ways to obtain this behavior. Camels will bend their front legs, drop to their knees, and then fold up their hind legs. You can prompt this, approximate it, or capture this behavior. After the behavior is established and stable (with longevity until you release verbally), you can later also train them to carry weight or to pull a cart.

Be alert to the natural history

Young bulls can hit sexual maturity between three and four years of age. During this time they can become more difficult to manage. As in many animals, the impact of rut can influence the animals' normal behavior and food drive.

Know the warning signs

The ears of this animal can tell you a lot about what she is up to! Watch for body tension and ear changes to avoid unpleasant interactions. Camels will bite, kick with all legs, and spit when agitated. They will also protest vocally. When fighting, camels will bite their opponent's front legs and use their necks and front end to push or crush the other. Handlers should also be alert to this behavior risk.

Resources of Interest

American Camel Company
Route One Box 3648B
Sidney, Montana 59270

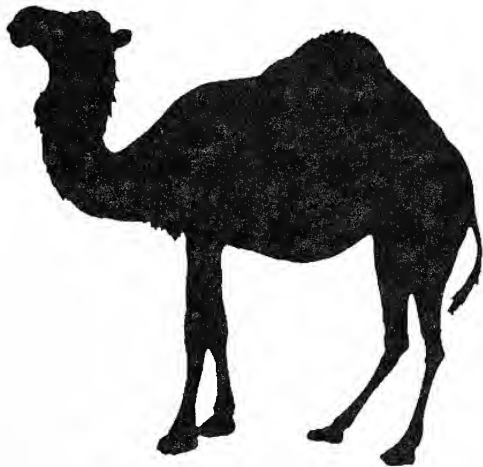
THE resource for camel-related products (training items, tack, camel milk, etc.,)

Camel Caravan Magazine
Route One, Box 3648B
Sidney, MT 59270

American Camel Club
185 Leavitt Road
Oswego, NY 13126

Click & Reward Training for Llamas (Videos)
Volume 1 & Volume 2
Rt. 3, Box 78
Chattaroy, WA 99003

Camel Training & Handler School &
Australian Camel Racing Association
Ask about the video packet for camel training.
PO Box 290
Camperdown
Victoria 3260
Australia



About the columnist: Since 1978 Diana L. Guerrero has worked professionally with both wild and domestic animals. Guerrero has been affiliated with and certified by a variety of animal programs in the USA and Europe. Information on her animal career programs, teleseminars and other projects are available through her website www.arkanimals.com. Questions for ABC's should be submitted to Diana by phone at (800) 818-7387, directly through the ABC's questionnaire or email on her website or via regular mail: c/o ARKANIMALS.COM, PO Box 1989 PMB 215, Big Bear Lake, CA 92315 USA.

Small Mammal Training at Utah's Hogle Zoo

By

Amanda Ista, Small Animal Keeper
Utah's Hogle Zoo, Salt Lake City, UT

Abstract

Starting small mammal training programs can be a challenging, frustrating but extremely rewarding experience. This paper highlights some of these obstacles encountered when initiating training programs for the mammals in the Small Animal Building at Utah's Hogle Zoo and focuses on the solutions found to overcome these obstacles. It describes programs with rock hyrax, Prevost's squirrels, Patagonian caviars, lesser tree shrews (*Tupaia minor*), black-footed cat (*Felis nigripes*), prehensile-tailed porcupines (*Coendu prehensilis*), and red kangaroos (*Macropus rufus*). The benefits of training small animals such as stress reduction and psychological stimulation are also emphasized. It describes how animals once deemed too shy and skittish to be trained will now willingly crate, shift, and allow hands-on manipulation. Hopes are that the successes of these programs will spur other keepers to pursue training small animals and remind keepers that training is beneficial to all animals whether it be a six ton elephant or a two ounce shrew.

Introduction

The first training programs in the Temperate Zone of the Small Animal Building at Utah's Hogle Zoo began in the spring of 2003. After completing a basic introductory course on operant conditioning techniques, watching hours worth of videos on animal training, and observing as a mentor who trained large felines, I felt confident that I could get all of the sometimes flighty, sometimes aggressive and sometimes just plain unpredictable mammals in the Temperate Zone crate and scale trained in the matter of weeks. After all, the concepts are simple. Just establish a bridge and bridge for desired behavior and the animal can be trained to do just about anything. Obviously, it was not that simple. Trial and error proved to be the rule and the constant with all the programs. Many lessons were learned and applied to each new program making the latest programs much easier to initiate than the first program attempted.

I will share some of the obstacles I encountered, many of which may or may not have a solution and most that are not reserved just for training small mammals. I would also like to offer some solutions and tips I feel may be helpful in training not only small mammals, but that can be applied hopefully to training all animals. I hope to stress that the benefits of training small mammals are more than worth the time and effort involved. Finally, I will give a brief overview of some of the training programs I am involved in and where those programs will lead in the future.

Obstacles

Challenges abound when implementing small mammal training programs. Initially, simply the diversity of the group provides the initial challenge. Temperate Zone training programs include animals from rodents to carnivores and insectivores to marsupials. Differences in basic biology and natural history ensure that every species will present different behaviors and reactions that need to be addressed. Then on top of the diversity between species, there is diversity between individuals of a species. Similar to humans, every animal has a different personality and therefore may react to situations completely opposite of a sibling or exhibit mate. For example, our male rock hyrax

(*Procavia capensis*) is extremely aggressive and wants to be near the keeper while the female is shy and hides from the keeper. The next challenge that presents itself is lack of information. There is not a plethora of documented training programs with porcupines or kangaroos. The next challenge, and usually the most difficult to conquer, is individual temperament. Almost as a rule, small mammals are shy and flighty. Many would rather hide, run away, or freeze rather than take their favorite treat from their keeper.

Then there are the more individualized obstacles. Number one on the list for the small mammals in Temperate Zone is the reward crisis. What food exists that would compel an animal to overcome its fears, reservations, and/or aggressiveness just to get a taste? And then how can that reward be given when the animal refuses to come anywhere in the vicinity of the trainer? Once these obstacles are overcome, a new set of challenges presents itself all based on fear. First, the fear is towards the trainer. Then towards the bridge. Once that is overcome, the fear switches to the target or the station or the crate or any minute noise that may occur during a session. Finally, once the reward and fear obstacles are overcome there is the challenge of figuring out what to do next. Once baseline behaviors are established, how can the program grow? What other behaviors are possible to teach these small mammals?

Solutions

First of all: Research. Knowing basic natural history about the animal or similar animals is invaluable when beginning a training program. Natural social systems can give insight into dominance issues that come up when training a group and even basic bone structure can tell how possible it is for certain animals to present certain appendages. Next go back to the basics. Applying basic training practices and learning by trial and error have proven to be the best solution in overcoming many obstacles. Even though there may not be documentation on crate training a hyrax, remember the same practices used in scale training a 400-pound tiger can be directly applied to scale training a two-ounce tree shrew with a slight bit of tweaking involved.

After that, the key is patience and persistence. First, patience in discovering what to reward the animal with. I tried numerous fruits, vegetables, nuts, and seeds before discovering the Patagonian cavies (*Docilchotis patagonum*) will train for mouse chow, the hyrax will train for lettuce, and the kangaroos will do just about anything for bread. Then comes persistence. Just because an animal enjoys a specific treat does not mean they will eat it in the presence of the trainer. I learned with many of the small mammals would rather wait for a keeper to leave or turn away before picking up the reward, and many are scared of the reward coming near them. But with short sessions every day, and some times twice a day, eventually the animal will learn to overcome these fears.

Especially important in small mammals is trust. These animals have to learn to trust the trainer. Once the animal begins to associate that trusting the trainer means rewards for them, progress in training programs increases exponentially. Trust building sessions are invaluable at the beginning of a training program and also at various times throughout the program.

Finally, once trust is achieved, bridge is established, and baseline behaviors are worked, look to natural behaviors for ideas on what to work on next. For example, kangaroos and hyrax are natural jumpers in the wild while prehensile-tailed porcupines naturally raise their quills to threaten enemies.

Getting Started

Now that the initial obstacles are overcome, official training can begin. The first step and the most

important is establishing the bridge. Many times with small mammals it is difficult to tell if the animal understands what the bridge means. I have found it is important to work a few more sessions or even weeks to make sure the animal understands that the whistle signifies a rewardable action. Next go back to basics again. Start with simple behaviors and work up so there is always something to fall back on. These simple behaviors include:

- Target – ask the animal to touch a target with a desired appendage or body part (many times the nose)
- Hold – start with asking the animal to hold on target and later applying the hold command to other behaviors
- Station – ask the animal to go to a specific location or object, usually away from the trainer
- Up – ask the animal to stand up on its hind legs if possible
- Down – ask the animal to go down on all fours or to sit down depending on its body structure and natural behavior

From these baseline behaviors, more complicated behaviors can be worked and many times will come easier if the above behaviors are well-established. These behaviors include:

- Crate – ask the animal to enter a crate and allow itself to be shut inside
- Scale – ask the animal to stand on a scale and hold until a weight is recorded
- Paw/foot – ask the animal to present appendage or allow appendage to be handled
- Manipulation – animal will allow trainer to touch certain body parts and/or manipulate the animal into position
- Other natural behavior related behaviors such as jumping, mock threaten, open mouth, etc

Benefits

Although these challenges seem difficult to overcome, the benefits greatly outweigh the time and patience required to conquer the obstacles when training small mammals. I feel the number one benefit to training small mammals is assistance in basic husbandry practices. Even though most of our small mammals are cared for free contact, many times keepers are not able to get close to the animals for close-up visual inspection let alone catch them up for weighing and medical procedures. Training allows keepers to encourage the animal to approach them voluntarily for inspection. This simple behavior is extremely beneficial as it allows a keeper to see a small scratch on the nose of the Prevost's squirrel (*Callosciurus prevostii*) or a quill from the prehensile-tailed porcupine stuck in a Weid's marmoset (*Callithrix kulii*). Obtaining weights is especially important for small mammals. The loss of even a fourth of an ounce in a tree shrew can be a symptom of disease whereas a gradual increase in weight can show that the diet may need to be adjusted for the black-footed cat. Crate training is an invaluable behavior which all animals in the Temperate Zone have been trained or in the process of being trained. By training the maras to enter a crate for their annual exam, we avoided potential broken legs, cut lips, or keepers being kicked. Another important benefit of training small mammals is enrichment. Training exercises not only the mind, but also the body as most animals are trained to target around their whole exhibit. It also reduces boredom and stress. Since initiating training programs in the Temperate Zone, we have seen more interactions with enrichment devices from the animals. For example, the kangaroos, maras and hyrax are no longer scared of everything new in their exhibit; instead they come to investigate.

Training Programs in the Temperate Zone of the Small Animal Building at Utah's Hogle Zoo
Nearly every animal in the Temperate Zone is currently involved in a training program. We are continually growing and evolving to meet the needs of these unique animals. The following is an overview of animals and behaviors currently trained:

- Rock hyrax (*Procapra capensis*) – shift, target, hold, crate, stay, come
- Prevost's squirrel (*Callosciurus prevostii*) – target, hold, station, up, down, crate, scale
- Patagonian cavy (*Docilchotis patagonum*) – target, hold, station, up, crate, face, paw
- Lesser tree shrew (*Tupaia minor*) – target, hold, scale, crate
- Black-footed cat (*Felis nigripes*) – shift, target, hold, open mouth, scale, paw
- Prehensile-tailed porcupine (*Coendu prehensilis*) – target, hold
- Red kangaroos (*Macropus rufus*) – target, hold, up

I am working to get all of the mammals crate and scale trained as well as working on more specific behaviors such as jumping and pouch checks.

Acknowledgements

I would like to give special thanks to the following people:

Dawn Neptune and Deana Walz – UHZ Behavioral Enrichment Coordinators

Jane Larson – Animal Care Supervisor

Brandy Von Weissenstein-Small Animal Keeper

Crystal Derusha – Small Animal Keeper

Jodi Zockle – Feline Keeper and Training Mentor.

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Legislative/Conservation Update

Compiled by Georgann Johnston
Legislative Advisor
Sacramento, CA



Wildlife Action Plans Created Under Federal Legislation

Wildlife agencies from all 50 states and six U.S. territories have submitted Wildlife Action Plans for approval by the U.S. Fish and Wildlife Service, establishing a nationwide blueprint to conserve imperiled species so they don't become threatened or endangered. If approved, the Wildlife Action Plans will be the first of their kind—a thorough state-by-state look at wildlife and the actions needed to ensure their survival. The action plans also will allow states and territories to continue to receive grants under the State Wildlife Grant program created in 2001. Since then, the USFWS has provided \$400 million in grants to states and territories for conservation efforts.

The law required states and territories to have their individual plans submitted to the Service by October 2005. The Service currently plans to distribute \$68.5 million in grants next spring for states and territories to implement approved action plans. The Wildlife Action Plans establish a coordinated strategy for wildlife agencies to help all wildlife species. In the past, most of the states and territories have had great success in managing game species. This new program will help fund expansion of their conservation work to include all wildlife species and their habitats.

Interior Secretary Gale Norton said she has instructed the USFWS to work with all Interior land management agencies as well as other federal land management agencies to support the goals and objectives outlined in the wildlife action plans in their agencies' land management strategies and plans. A team of eight U.S. Fish and Wildlife Service biologists and five state wildlife administrators are in the process of reviewing the plans and will forward their recommendations to the Service Director for final approval. States may use the funds for either planning or project implementation activities. For the 50 states, the apportionment is based on a formula that uses each state's land area and population. States may receive no more than five percent or less than one percent of the total available funds.

Each states' or territories' plan must contain information on low and declining populations of wildlife and the habitats they require, identify problems that affect these populations, identify research and survey efforts to improve their conservation efforts, determine actions and priorities. Once the state plans have been approved agencies will revise and update their plans at least once every 10 years.

Source: USFWS Press Release 2 November 2005

USFWS Request Help from Native American Tribes to Conserve Endangered Species

The USFWS recently issued a request for proposals from federally-recognized tribes to conserve and recover endangered, threatened and at-risk species and other wildlife on tribal lands under the Tribal Wildlife Grants (TWG) and Tribal Landowner Incentive Programs (TLIP).

"Native American lands are a critical component in the national mosaic of fish and wildlife habitat and I am proud of what we are able to do in Indian Country," Service Director H. Dale Hall said. "Through these two grants programs, we are building important partnerships with tribes that empower them to conserve tribal land and recover their wildlife resources."

President Bush developed the two programs, which are similar to the Landowner Incentive and State Wildlife grants programs, to conserve and restore the habitat of threatened, endangered and at

risk species on private lands. The programs were modeled after a successful program implemented by President Bush in Texas when he was governor. This will be the fourth year that these grant programs have been available to Indian tribal governments.

Grants in the two programs are awarded through a competitive process. TWG, in fiscal year 2006, has \$5,971,000 available for grants that will benefit wildlife and wildlife habitat, including species that are not hunted or fished. The maximum award under this program is \$250,000.

In fiscal year 2006, \$2,388,600 is available through TLIP for federally-recognized Indian tribes to address protection, restoration, and management of habitat to benefit species at risk, including federally listed endangered or threatened species, as well as proposed or candidate species. The maximum award under this program is \$150,000.

Indian Tribes have a controlling interest in more than 52 million acres of Tribal trust lands across the nation, with an additional 40 million acres held by Alaskan Native Corporations. Much of this land is relatively undisturbed, providing a significant amount of rare and important fish and wildlife habitat.

TWG and TLIP have funded projects ranging from comprehensive surveys of plant and vertebrate fish and wildlife on reservation lands to habitat and fish restoration and development of new resource management techniques. Some of the at-risk species benefitting from these projects include lake sturgeon, sage grouse, antelope, black footed ferret, and the eastern cougar. *Source: USFWS Press Release 4 November 2005*

Hedgehogs Under Fire in Scotland

Scottish Natural Heritage (akin to the USFWS) is trying to kill all feral hedgehogs on the Uist Islands off the west coast of Scotland. The effort has been ongoing since 2003, but in March 2005 the SNH announced that it would augment trapping and killing them by lethal injection and gas with training dogs to flush them out to be shotgunned. SNH reported that it had killed about 500 hedgehogs over a two-year period while Uist Hedgehog Rescue, a non-governmental organization, said it had captured and relocated over 600 hedgehogs to the mainland. SNH withdrew the dog and shotguns scheme on 20 September 2005. "These healthy animals simply do not need to be killed", responded a spokesperson for Uist Hedgehog Rescue. "Hedgehogs on the mainland are actually in decline." *Source: Animal People News October 2005*

Australian Parliament Considers New Agency to Eradicate Feral Species

The Australian House of Representatives Agriculture Committee voted on 26 September 2005 to create a new national agency specifically to kill feral species. The species of interest would include rabbits, burros, camels, pigs, mice, foxes, and domestic cats. Foxes and domestic cats are still the major predators for rodents despite more than 150 years of government efforts to eradicate them by means of poisons and introduced diseases. The committee recommendation came after an 18-month inquiry – and one day after the Tasmanian Farmers and Graziers Association called for compulsory cat licensing. The farmers' group claimed that toxoplasmosis carried by cats caused miscarriages among farmed sheep, the most abundant introduced species in Australia. The agriculture committee rejected the suggestion of Animals Australia that established introduced species should be managed in a more humane manner. *Source: Animal People News October 2005*

Mark Twain's Jumping Frog Loses Latest Round

The USFWS has dramatically scaled back the California red-legged frog's (*Rana aurora draytonii*) official home with a new proposal designating approximately 737,000 acres as critical habitat. The red-legged frog is the largest native frog in the United States. It was made famous in a story by Mark Twain about the species jumping ability. The new area is a significant reduction from the original plan of including over four million acres in the species protected habitat. Officials claim they reduced

the acreage because of a “more precise mapping” of the habitat frogs really need. Previously, officials included entire watersheds into the protected zone. Some Forest Service land was also excluded, on the theory that it is already well protected.

The USFWS economic analysis estimates that the frog’s critical habitat will cost between \$3 to \$5 million by 2025. Most of this amount will be paid by developers in the form of potential income forfeited due to lost construction opportunities. *Source: Sacramento Bee Newspaper 4 November 2005*

Wild Antelope Given ESA Protections While “Canned Hunts” Continue

In September 2005 the USFWS issued a rule listing three African antelope species—the scimitar-horned oryx (*Oryx dammah*), addax (*Addax nasomaculatus*), and dama gazelle (*Gazella dama*)—as “endangered” under the Endangered Species Act, officially ending 14 years of efforts to protect these species long considered on the verge of extinction. However, at the same time the USFWS issued a second rule stripping U.S. captive-bred members of those species of their ESA protections from trophy hunting, live transport and sale, and the trade in sport-hunted trophies. In other words, after years of consideration and months of public comments, the agency decided to protect only the wild members of these three species, leaving U.S. captive-bred members exposed to trophy hunters at canned hunting operations, and creating a domestic commercial market for these animals that could leave all members of the species vulnerable to men carrying guns.

Decades of over hunting and habitat loss have driven the three antelope species to the very verge of extinction. The scimitar-horned oryx is already believed to be extinct in the wild, and is being reintroduced into the wild with animals from conservation breeding programs in zoos. The addax is considered by biologists to be critically endangered, with most wild populations already gone or greatly diminished. The dama gazelle has a wild population of fewer than 700 animals.

In February 2005, the USFWS finally moved to list the species, but proposed the unprecedented step of declaring all U.S. captive members of the species ineligible for protection under the ESA. In response, a broad coalition of conservation and animal protection organizations led by the Humane Society of the United States and Defenders of Wildlife notified the USFWS that they wholeheartedly supported listing the scimitar-horned oryx, addax, and dama gazelle as endangered under the ESA, but vehemently opposed the proposed canned hunting exemption.

There are other problems with the agency’s new rule, too. Under current ESA rules, whenever a canned hunting operator wants to kill captive-bred members of an endangered species, he or she has to file for a special permit with the USFWS. The permit application then must go through the official process, in which the request is published in the *Federal Register*, the application materials are made available to the public, and public comments are sought. Then, in order for the USFWS to justify granting the so-called “cull” permit under the Endangered Species Act, the canned hunting operator must show that he or she is making some contribution to the “enhancement of the survival of the species”—usually by contributing a mere 10% of the proceeds from the hunt to an organization purportedly engaged in conservation activities.

The new USFWS rule for the three African antelope species does away with all those requirements for these animals. The new rule also means that canned hunting operators will not have to register with the Captive Bred Wildlife program and will not have to submit reports to the federal government. In other words, the public will have no oversight, and no information, on what is being done to members of a species listed as endangered by their own government. Because of this, a number of conservation organizations have joined together and filed a suit against the USFWS asking that a court compel the federal agency to drop the amendment allowing for hunting of captive bred members of the three antelope species. The matter has not yet been scheduled for a hearing. *Source: Humane Society of the U.S. Press Release 26 October 2005*

Norwegian Whale Hunters Fail to Meet Quota for 2005

Norwegian whale hunters failed to catch the permitted number of whales this year, Norway's Ministry of Fisheries and Coastal Affairs announced one day after the 2005 whaling season ended. The 30 whaling boats that participated in this year's hunt only culled 639 minke whales (*Balaenoptera acutorostrata*) out of a record high quota of 796.

This is the second year in a row that Norwegian whale hunters, who generally call for small annual increases in the whaling quotas, have not managed to fill their catch quota. "This does not mean that we will reduce the quota next year," said Halvard Johansen, spokesperson for the Ministry, adding that weather conditions around Jan Mayen — a barren island in the Norwegian Sea — were to blame for the lackluster results. Only five whales were harpooned in this zone out of a permitted 145 culls.

"The weather has not been good, and since oil prices have increased significantly the whalers haven't wanted to travel so far for such an unpredictable result," Johansen said. This year's quota was the largest allowed since Norway re-launched its commercial whale hunting program in 1993 in defiance of an International Whaling Commission moratorium on the practice, in place since 1986.

The Norwegian government has claimed that hunting the minke whale poses no threat to the species, which is estimated to number about 100,000 in the North Atlantic. For the first time ever, no inspectors were present on the Norwegian whaling ships during the 2005 whaling season. The boats were instead equipped with "blue boxes" that counted the number of culls. *Source: Animal Planet News Online 5 November 2005*

China Plans to Lift Ban on Trade in Tiger Parts

Wildlife experts have warned that China's plan to lift a 12-year ban on domestic trade in tiger parts could drive the already endangered species into extinction. The Chinese government has confirmed to non-governmental organizations news reports that it is considering an experimental reopening of trade in tiger parts for traditional medicinal use in government hospitals.

Crawford Allan, spokesman for TRAFFIC, the wildlife monitoring network of the Worldwide Fund for Nature (WWF), says Beijing is considering a proposal to specifically lift the domestic trade of stockpiled tiger bones removed from animals which have died of natural causes while under captivity. However, he says any legal trade in tiger parts will threaten the world's remaining wild tiger populations by making it easier to "launder" black market parts.

The Worldwide Fund for Nature's Sybille Klenzendorf agrees. She says there are as few as 5,000 tigers in the wild in the world and "allowing any legal sales in China would give cover to black marketers who poach wild tigers." *Source: ABC Radio Australia September 27, 2005*

Coalition Aims to Fight Wildlife Trafficking

The State Department hopes to get the cooperation of several Asian countries — as well as U.S. citizens — in cracking down on illegal wildlife trafficking. Several organizations including the Smithsonian Institution have signed on to the new Coalition Against Wildlife Trafficking, which was announced in September at the Wildlife Film Festival in Jackson Hole, WY.

The goal is to improve law enforcement and reduce demand to stem the \$10 billion annual trade in illegal pets and wildlife products, according to Claudia McMurray, deputy assistant secretary of state for environment. "What we're finding is the laws are largely on the books but they're not being enforced because of lack of personnel, lack of training and corruption in some cases," she said.

Besides being harmful to wildlife — especially endangered species — she said trade in wildlife and wildlife parts often goes hand-in-hand with other illegal trades, like drugs and weapons: "One week it might be wildlife and another week it could be cocaine or heroin." *Source: CasperStarTribune.com 9/24/05*

Kiwi

Captive and in the Wild

January 2005

By
Kathy Brader, Senior Bird Keeper
Smithsonian National Zoological Park, Washington, D.C.

There were several reasons why I chose to travel to New Zealand to study kiwi (*Apteryx sp.*), in captivity and in the wild. I have been privileged to work with these odd and interesting birds since I became a keeper at the Smithsonian National Zoological Park (SNZP) in 1987. SNZP was the first overseas institution to hatch a living brown kiwi (*Apteryx mantelli*) in 1975. The keeping of kiwi in captive overseas zoos has been sporadic and little studied. At this time with the numbers decreasing in the wild at alarming rates, and the generally poor and sporadic reproduction rates in overseas zoos, I feel that if we want to keep a healthy population of this species overseas it is crucial that we have a better understanding on the care and breeding of these birds. Overseas zoos are standing at the brink of where we need to pull together to ensure genetic diversity and a healthy number of birds. I wanted to gather the most current information available, to make contacts with Department of Conservation (DOC) officials, captive zoo officials and people involved with the International Studbook, the DOC Kiwi Recovery Program (KRP) and Operation Nest Egg (ONE). I am hoping to generate renewed interest both here, overseas, and from New Zealand officials.

Kiwi are believed to have diverged from Australian ratites about 68 million years ago and are considered to be more closely related to emu (*Dromaius novaehollandiae*) and cassowary (*Casuarius casuarius*) and not the moa (*Dinornis sp.*) as previously thought. As discussed in the previous article (Nov. 2005 AKF), New Zealand is a land that is populated with unusual wildlife that exist nowhere else. The kiwi are no exception, they have no close relatives anywhere in the world. They belong to the order Apterygiformes and according to the latest information there are five species and two races. DOC breaks them into six taxa for conservation purposes. Ongoing DNA analysis may give us further insight into more definitive relationships between the species. Kiwi are nocturnal flightless birds that burrow underground for sleeping and nesting areas. When the birds were first described to the European scientific community, they were declared a hoax, now they are called an honorary mammal. They are set apart from other birds in very basic differences: their feathers are hair or bristle like, they have marrow filled bones, two functioning ovaries, no tail, vestigial wings, large ear openings, extremely large heavy legs and feet, blood temperature of 38°C (100.4°F), and nostrils that are on the end of the bill. Their toes and legs account for one third of their body weight. The female is larger than the male.

It comes as no surprise that there are several myths surrounding such a strange creature. Many people believe that they see poorly due to the size of their eyes. For a nocturnal species their eyes are extremely small, but they see well enough to avoid running into trees in the dark or light. Some kiwi actually come out during twilight to feed and some have been known to come out during the day to defend their territory. This brings us to another myth - though they may look cute and cuddly, kiwi are extremely aggressive birds. They are very strong and usually bad-tempered. Adults use their razor sharp claws as weapons to slash. They do not use their bills as weapons, but will use it to sound warnings, snapping it several times. They jump and slash to defend their ground, sometimes to the death. They may use their bill to hold on to their opponent to attack more effectively with their feet. DOC officers use this strong defensive attitude to attract kiwi by imitating their call as this will sometimes bring the birds out into the open to defend their territory. Kiwi are not "slow" thinkers contrary to the way they may appear - they alter behavior in the light of experience. DOC workers report that many birds once caught using calls do not respond a second time. They may come out, but will stand back and call to challenge the intruder, circle around the area, possibly trying to get downwind to smell if the "kiwi" is real. They are fast moving and big travelers, very agile, climbing over large fallen trees, rocks, etc.

These birds also take a wide span of temperature ranges, from very cold, (some live in snowy high altitudes), to warmer more humid climates. As long as the birds have access to dry burrows, they can handle a variety of climates. They do have a tendency to slow down if the weather becomes too warm (over 75° F/23.8°C).

The kiwi beak is the perfect probe. They are the only bird that has nostrils located at the end of the bill. They have the second largest olfactory bulb among all birds (relative to the size of its forebrain); they are surpassed only by the condor, and not by much. They walk along the ground, tapping their bill, probing the leaf litter, soil and sniffing loudly. Because kiwi live in very diverse habitats there is no "typical" kiwi diet, though most of what they eat consists of invertebrates, especially worms. They eat beetle larvae, cicada nymphs, beetles, crickets, weta, slugs, snails and crayfish. They also enjoy berries, seeds and some leaves.

Although kiwi lay a very large egg according to their body size (roughly 15-23% of their body weight per egg) it is not the largest, and there are petrels that lay an egg that is about 30% of their body weight. The eggs of all kiwi species have a smooth, thin unmarked white or greenish-white shell. But what makes a kiwi egg different is that they contain the largest proportion of yolk (shared only with megapodes) and the extreme in incubation time (shared with the large albatrosses, *Diomedea*). The yolk is 61% of the content and probably correlates to the advanced state of the chick when it hatches. Incubation responsibilities depend on the species; there are some that share. Kiwi chicks do not eat for the first 5-12 days, depending on their absorption of the internal yolk. They do not receive any parental care, such as feeding or brooding. The male in some species may stay in the nest with the youngster for a day to a week, but they do not brood. Kiwi do not imprint which makes them ideal for release programs. Until recently, it was thought that over-laying by females may cause problems for them, but research has shown this not to be true. DOC and others have documented, over the past several years, females laying 4-5 eggs in a single season with no hardship or physical problems (in the wild and in captive situations). New Zealand institutions no longer separate their pairs since kiwi can be difficult to introduce (or reintroduce) with the female sometimes causing injury or death to the male. This alleviates the problem of reintroducing birds each breeding season.

The first known kiwi to be held in a captive situation was a female North Island Brown Kiwi (*Apteryx mantelli*) sent to the Zoological Society of London in 1851 where she laid several eggs and lived for several years. Before 1872 more birds were sent over to London including more N.I. brown kiwi, Southern tokoeka (*Apteryx australis*), little spotted (*Apteryx owenii*) and great spotted kiwi (*Apteryx haastii*). Wellington Zoo first kept kiwi (N.I. brown kiwi) in 1912. Hawkes Bay Acclimatization Society hatched the first kiwi in captivity in 1945 (N.I. brown kiwi). SNZP received their first pair of N.I. brown kiwi in 1968 as a gift from the government of New Zealand. SNZP hatched the first overseas kiwi in 1975 (this male is still alive at SNZP). Nineteen-seventy-two was the first year in New Zealand when N.I. brown kiwi was displayed in nocturnal houses in Auckland and Otorohanga, and the first little spotted kiwi chick was hatched in captivity (Mt. Bruce). In 1977, the first full-term artificially incubated N.I. brown kiwi egg was hatched at Otorohanga. Great spotted kiwi first hatched at Otorohanga and Mt. Bruce in 1986 followed in 1988 by the first little spotted kiwi at Otorohanga.

Although all kiwis have a similar appearance, there are distinct differences in general ways and habits.

Little spotted kiwi (*Apteryx owenii*), the smallest of the kiwi, are now found only on Kapiti Island and several smaller offshore islands. This is the only species whose numbers have increased in the wild (due to the protection offered on the offshore islands), there are about 1,500 birds left. There were no 'little spots' left on the mainland by the time kiwi were beginning to be studied although it was known they shared habitats with the tokoeka in some parts of New Zealand. On Kapiti Island they utilize most parts of the island. They are about the size of a bantam hen. Feathers are banded transversely dark grey and silver grey. The females weigh about 1.5 kg (3.3 lbs.), males 1.2 kg (2.64 lbs.). The female bill is about 8cm in length (3.15 in.); the male is slightly smaller, 7cm (2.75 in.). The male incubates alone for 65-70 days, the chicks leave the nest about one week old, and leave the parental territory in 4-12 months. They are listed as endangered and range-restricted.

Great spotted kiwi (*A. haastii*) are the largest of the kiwi and are found in the northern and western districts of South Island. They prefer mountain beech forest or sub-alpine tussock grasslands. Their plumage is banded transversely dark grey and silver grey, sometimes with a chestnut or reddish tint. The female weighs about 4 kg (8.8 lbs.), the males are about 3kg (6.6 lbs.). The female bill is about 12.5cm (4.92 in.) and the male's is 10cm (3.94 in.). The populations that are found in the higher rugged terrain are more stable, probably due to lesser numbers of predators living in the area. The populations found on the lower coastal range are declining faster. The population estimate is around

17,000 birds. Both sexes share incubation for 65-75 days. Nothing is known about when chicks leave the nest. They are listed as threatened, losing about 2% of their population a year.

The Brown Kiwi (*A. mantelli*) up until 1995 was divided into three varieties: North Island Brown, South Island Brown and Stewart Island Brown, DNA has since changed our understanding of the browns. They are now divided into three species and two varieties: brown kiwi, rowi and tokoeka. The tokoeka has two varieties, Haast tokoeka and Southern tokoeka.

Rowi (*A. rowi*) are the 'newest' kiwi, only identified in 2003 as a separate species. There are only 250 of these birds and they are classified as nationally critical. They have softer grayish plumage, sometimes they have white facial feathers. They are about the same size as the brown kiwi. They are found in the Okarito (S.I.) lowland (podocarp/broadleaf) forest. This area was designated in 2000 as the Okarito Kiwi Sanctuary and covers about 11,000 hectares (42.47 sq. mi.). Both sexes share incubation for 65-75 days. The chick leaves the nest after a week and the parental territory from six months to several years.

Tokoeka (*A. australis*) and both varieties, Haast and Southern, are found only on South Island. The Haast are typically found near the alpine tops of mountains, some are found near sea level and are found in the Haast range in south-west South Island. Their numbers are very low - around 300 birds - and they are listed as extremely rare. They are brown with distinctive rufous plumage and down-curved bills. They actually live at the snow line in sub-alpine grasslands and will dig their burrows in the snow when it covers the ground. Haast kiwi parents both incubate their chick, but nothing is known about when the chick leaves the nest. The Southern variety are found on Stewart Island and in Fiordland and the southwest tip of South Island. Their numbers are more numerous, estimated around 30,000 birds. They are more communal in their habits than most of the other kiwi species. The tokoeka on Stewart Island are found in the southern part of the island and can be found feeding on the beaches. Both sexes share incubation, though the male does two-thirds of the 70 days. Their chick will leave the nest after the first week, but may remain in the parental territory for up to seven years.

The best-known kiwi is the North Island brown kiwi. They are brown in color and originally preferred lowland and coastal native forests. Their numbers are estimated around 25,000 birds, but are declining at 4-5% a year. At this rate the population halves about every 15 years. The primary problem is dogs preying on the adults; the breeding birds appear to be extremely vulnerable, probably due to sitting on eggs for such a long period of time. Some local populations are disappearing faster probably due to the habitat chosen. If the area has a large population of rats, then there are more stoats, which then prey on the young kiwi. These birds seem to be adaptable to the changing habitats and will use abandoned farmland and exotic forests. The male alone incubates the egg for 70-89 days. The chick leaves the nest after a week, but may return daily for up to six weeks, before leaving the parental territory at 6-9 weeks. This is the only species that is kept in overseas institutions.

It is not hard to understand why flightless birds in New Zealand are in such trouble. The statistics are disturbing - 95% of all kiwi chicks left in the wild in unprotected places die in the first six months of life due to predators. The primary predators of young kiwi are stoats followed by cats. Dogs are the number one predators of adults. Kiwi have no real protection on their breast areas and when a dog grabs them it usually crushes the area. Because of this, several programs have been put into place. Kiwi sanctuaries on the mainland and on offshore islands, and Operation Nest Egg (ONE) are the two most productive. I traveled to three different DOC-operated sanctuaries and several places where the operation of the ONE takes place.

In 1994, ONE was started by DOC and is supported by various organizations with the realization that kiwi populations were crashing due to mammal predators. The original plan involved taking eggs from the wild and hatching the chicks in captivity, rearing the chicks up to a certain weight, and releasing them back into the wild from where the eggs were taken. The eggs are removed at night when the males are off the nest, so there is no disturbance of the birds while actually on the egg. By returning the chicks to the same area they came from insured that the gene pool was kept pure. ONE chicks have a 40% success rate of attaining adulthood compared to chicks left on their own, which only have a 5% chance of surviving to adulthood. It has financial support by various financial institutions, the biggest supporter is the Bank of New Zealand which has participated in saving kiwi since 1991. The Bank of New Zealand has several different programs that underwrite different projects for kiwi conservation. The project has changed over the years as the understanding

of kiwi has improved. It also was refined when the Rowi was brought into the program, as both sexes incubate the egg. This meant the egg was never left unattended. The egg is allowed to hatch and after the parents depart, usually within a few days, the chick is pulled and reared up in captivity and then released. Another change was that they released chicks into kiwi creches. This may be a large predator-proof area on the mainland or on offshore islands. The local Maori often have a ceremony to welcome back the young kiwi. Since 1994, 360 kiwi have been released. The 2003-2004 season saw its first third-generation egg laid. The grandfather was hatched at Auckland Zoo. All kiwi chicks are microchipped prior to being released. A study has been conducted to see if being reared on captive diets had any long-term effect on the birds. This study has proven that the ONE birds have no problem adapting to finding and eating a natural diet.

I traveled to the Northland with the Whangarei DOC officers to see if I could view brown kiwi in the wild. This area has 2000 hectares (7.7 sq. mi.) of DOC-owned land and 6000 hectares (23.1 sq. mi.) in private land. These are in six separate forest areas. Part of the ongoing work is restoration of the native flora. They work (like most kiwi sanctuaries) with the local Iwi (Maori tribes) and the local people who live around the area. This is vital if the kiwi are to survive. There is constant trapping and other methods in place for the control of predators. They have been participating with ONE since the late 90's. They estimate that from a handful of birds, there are more than 100 birds existing in the area.

I went out with DOC officer Pete Graham and his kiwi dog Manu (it's Maori for bird), one of the few dogs trained for detecting kiwi. There are only a handful of dogs trained for this purpose. †Kiwi dogs are extensively trained and must pass several tests before being granted a permit to work. They also must be muzzled at all times while working to ensure that no accidental injury occurs to the birds. Manu is a Vizla (*Canis familiaris*) that was originally going to work as a predator dog, but kept finding kiwi and her training was switched over to kiwi work. She has discovered over 20 unknown kiwi since starting her work. She was amazing to watch, the undergrowth is thick and the area where we were is very rugged.

We traveled about an hour away from the city center to one of the managed sites. It was pouring rain and Mr. Graham thought it unlikely we would find any birds in such weather. Fortunately this proved to be wrong. Between the transmitter on the birds and Manu, we located two males. Only males are outfitted with transmitters as they are the ones that incubate. We found one male incubating (which we did not disturb) and one 15-month-old male, which we removed from his burrow to record his weight and bill measurements. I also learned a new way (for me anyway) of holding kiwi. A good way to hold a struggling kiwi is by their feet; hang them upside down, just like pheasants and chickens, the birds quiet down and there is less chance of them hurting themselves or the holder.

Unfortunately four adult breeding kiwi were killed by a dog in the previous weeks before I arrived. This represents a huge loss in the local population. Although these areas have some fencing, they do not keep out predators. The areas are clearly marked as kiwi reserve areas and there is a strong anti-predator defense in place, (including stoat and cat traps, and poison boxes) but sometimes it is not enough and the results can set back a lot of hard work. An outreach program has DOC officers going out to farms, schools and homes to teach people about the kiwi in the area and about the hazards of letting dogs and cats out to roam. As with all of these types of programs, you reach some people.

I went to Te Urewera National Park that is located near the middle of North Island in the Hawkes Bay area. It is the last place on North Island where you can still find large native bush. It has 500,000 acres (~780 sq. mi.) with Lake Waikaremoana located in the middle. One of the Great Walks is located around the lake. The bush comes right to the edge of the lake on all sides except for the eastern side that is hemmed in by steep cliffs. It is not an easy place to get to; no public transportation is available and very few accommodations. DOC and the local Iwi run the kiwi operation that is only accessible by boat across the lake. It is an impressive area; egg retrieval and reintroduction are both ongoing operations. The kiwi are actually located on Iwi land and the day-to-day operations are run by the Iwi and overseen by DOC. It was one of the most beautiful places I have ever seen. It is one of the last pristine habitats left on North Island. DOC and Iwi have just completed a kiwi aversion fence. This will not keep out all predators, but allows the rangers to keep kiwi in an area that is easier to control. They also participate in ONE.

In Wellington, just over two miles from the city center is a unique park. In the late 1800's a dam was erected to hold water in a reservoir for the city. By 1991 it was taken out of the city water system due to earthquake concerns. This left a large tract of land that was suitable to return to native bush. The Karori Nature Sanctuary was created to return native flora and fauna to Wellington. The Sanctuary is run by several committees, including the City Council of Wellington, DOC, Community Trust board, and the local Iwi. They began the anti-predator fence in 1997 and completed it in 1998. They took another year to eradicate all non-native mammals, except for mice. It encompasses 252 hectares (~623 acres), including wetlands. They are removing non-native bush and restoring all native plants. It has a 500-year plan and just celebrated its 10-year anniversary. They brought back little spotted kiwi to the mainland for the first time in more than 100 years. They introduced the kiwi in 2001 with 20 birds and now boast over 90 birds. You can now hear kiwi in downtown for the first time in the last 140 years. It is an amazing, peaceful park in the middle of an urban setting. They conduct research as well, protecting the breeding native birds and insects. On occasion they conduct guided night tours.

At the Auckland Zoo I was hosted by Andrew Nelson, who is Team Leader for the Native Fauna, Amphibians, Fish and Reptiles. He serves on several committees for several species of endangered birds and reptiles. He has been involved with the kiwi program for a number of years. They are active participants in the ONE. While I was there, they had four chicks of varying ages, including a day-old chick and three eggs in various stages of incubation. They rear their chicks to about 1500g (3.3 lbs.) before they are sent back to the wild, most going back to the Northland area for reintroduction. They have repatriated 114 birds back to the wild. They have played a part in helping to design the guidelines for the incubation and rearing of young kiwi. They have a separate facility for the incubation and rearing of young kiwi; no other species is reared or incubated in this facility. They also have several pairs of breeding brown kiwi, including one pair on display. They have a camera in the nest box so the public can see the male incubating eggs. The nocturnal house has kiwi with a morepork (a small owl) (*Ninox novaeseelandiae*) and tuatara (*Sphenodon punctatus*). The Auckland Zoo has been undergoing a major renovation process throughout the park. Although one can see mammals from all over the world, one will rarely see any bird species from other parts of the world due to the strict importing regulations of the government. This is to try to prevent any more introductions of foreign species. Auckland Zoo runs a daily native bird show that consists of several different bird species. They have just received permission to include a kiwi, a young bird hatched at Auckland a few months ago, in the show. They had to receive permission from four different government agencies to allow this kiwi to be used.

Rainbow Springs Kiwi Encounter opened its new facility in December 2004, though they have been in the ONE program for many years. The Kiwi Encounter is on the grounds of the Rainbow Springs and is privately owned. Everything in the facility is on public view, from the incubator to the hatching and nursery rooms. These are all behind glass and guides conduct tours explaining what the visitors are seeing. They raise more chicks than any other institution in New Zealand. They had raised over 80 chicks so far for the 2004-2005 season, and hope to raise more than 100 chicks next season. The chicks are raised in the nursery area until they are 500grams (1.1 lbs.) and then they are moved to the off-display kiwi pens and held until they are 1.2 kilograms (~2.65 lbs.). Most of these chicks go back into the wild; some go to other zoos for display and captive breeding. The ONE chicks are put into a three-week quarantine pen where they undergo several fecal, ectoparasite checks and cloacal swabs to ensure that they do not take anything into the wild. †Coccidia is a big concern for young birds, it may be fatal, which is why frequent fecals are taken on all young birds. This same protocol is followed by all zoos participating with ONE. They raise chicks from nine various areas in New Zealand (all brown kiwi). As of 2004, they had released 174 chicks back into the wild. They also have a captive pair of brown kiwi on display that have successfully bred. They have several pairs off-display.

While I was working at the Kiwi Encounter, I got to meet and work with Suzanne Bassett from Massey University. She is studying the incubation for kiwi. Ms Bassett hopes to improve the success rate of kiwi incubation. She teaches two courses on kiwi incubation to participating zoos in ONE. One of the programs Ms. Bassett is researching is the misdiagnosing of kiwi egg fertility. There has been what appears to be a high rate of infertility of kiwi eggs; this is probably due to a misunderstanding of kiwi incubation techniques used in captivity. Kiwi incubation has been refined by the different zoos and all follow the same routine established for temperatures and humidity. As more eggs are being artificially incubated, more work is going into the incubation techniques, including different types of incubators. All use a still air incubator and hand turn the eggs four times

a day. Kiwi House Otorohanga did run a successful incubation by not turning the egg, so this may change artificial incubation down the line as more research is done. Each egg is weighed daily to record weight loss and adjustments are made accordingly. Eggs are removed from the incubator for an hour a day up to 55 days. Generally fertile eggs will show development between 10-15 days. It is preferred to leave the egg with the bird for at least 30-35 days before pulling it, but sometimes eggs can come from the wild at various stages, including near hatch dates to newly laid eggs. At Westshore Wildlife Reserve, Mr. Tony Billing received two eggs that had been abandoned and spent at least two days in frost conditions. Both eggs successfully hatched a couple weeks later with no problems. Some eggs come in with fine to severe cracking in the shell; these eggs are repaired using tape or clear nail polish. As long as no bacterial infection has been introduced into the egg, some of these eggs will go on to hatch (even some that are badly smashed). All facilities try to keep the eggs in the dark or at least dim light and keep candling down to a minimum as the embryo reacts strongly to light. Instead of candling, after 36 days many places use a straw on top of the egg to watch for movement, though they may candle once a week to document the air cell growth. Once the chick breaks into the air cell it may take another four days to break out. Kiwi have no egg tooth and they will use their legs to break out of the egg. The actual hatching generally takes about 30 minutes.

They cannot stand steadily until about four days of age, though they start shuffling at about 60 hours. They can bruise easily, so it is a good idea to use towels or rubber matting to provide a soft surface for the birds. They may actually lay on their sides for a while after hatching; this is not abnormal. The mat or towel will also give support for their legs; kiwi chicks can get splayed legs. They should be handled very carefully for the first week or so, as they have a large amount of yolk that they will slowly absorb for the next week or so. At about seven days they are walking normally. Generally chicks are not offered food until about Day 8, but are not force-fed until they have lost 30% of their hatch weight. They usually regain their hatch weight by about 10-15 days once eating commences. Kiwi chicks may come out to feed at any time,†but after five weeks they generally start only coming out at night. All the places I visited used the same “kiwi brooder” box. After they are able to stand, they are put into the large wooden boxes that have two compartments. The box has a lid that covers both areas. The small “brooder” den has a heat source that is turned off after a couple of days. This larger area will usually have a peat moss covering the bottom and the food and water is put in this part. They are experimenting using rubber type matting on the floor.

The last place I worked was the Westshore Wildlife Reserve that is operated by the Napier City Council. It is run by Tony Billing. Mr. Billing is the vice-president of the Australasian Regional Association of Zoological Parks and Aquaria, director of the Kiwi Research and Captive Breeding facility at the Westshore Wildlife Reserve, technical advisor to Project Kiwi, and a member of the National Kiwi Captive Management Advisory Committee. He is also on the board of the ARAZPA zoo ethics committee. The Kiwi facility is not open to the public, although the reserve that is home to a diverse group of water birds is. I was given free access to view kiwi at night. They have been active in ONE since the start and work with several different regions. They had 10 kiwi chicks and two pairs of breeding kiwi. One of the females is “Fern”, a bird that hatched in 1975 and regularly produces several chicks a year. In the city of Napier (Westshore Wildlife Reserve sits on the outskirts of the town) is the Aquarium at which a pair of kiwi are on display, Mr. Billing is their technical advisor. Mr. Billing has initiated several programs on kiwi in captivity, including looking more closely into artificial kiwi diets. The Westshore Wildlife Reserve produces a special kiwi vitamin mix that is now used by all captive kiwi institutions in New Zealand. SNZP is investigating the possible importation of this vitamin mix for US zoos.

I made a stop to Kiwi House Otorohanga which is the only place in New Zealand that houses and breeds three of the species of kiwi. They have several firsts in kiwi milestones. I was taken around by the curator, Mr. Eric Fox. They have large spotted kiwi and brown kiwi on display. They have breeding pens off-display for brown kiwi, little spotted kiwi and large spotted kiwi. They also participate in the ONE program. They are a nonprofit zoo which not only works with kiwi, but several endangered bird and reptile species.

I finished my tour of New Zealand by going down to Stewart Island. This is the third largest island located at the bottom of South Island. There are no expanses of pasture here, no wide spread farming or recent forest clearance. The island's economy is based on tourism and fishing. Ninety percent of the island is now parkland. Stewart Island is a magical place; for the most part it is a pristine island. They do have introduced predators on the island including cats and deer, but no stoats or possums so far. You can take night tours with a guide who has a permit from DOC to take

small groups of visitors (up to 15 people) to see Tokoeka on Stewart Island. They are carefully controlled walks. This is the same beach where David Attenborough filmed kiwi feeding on the beach at night for his BBC special *World of Birds* a couple of years ago. We saw three birds, including a female feeding on the beach. Our guide held a bright spot on her and she totally ignored our group while she was feeding. We also heard a pair of birds calling †to each other as we walked back to the boat. At this point the birds seem to be holding their own. There are only about 350 people who live in the small town of Oban on Stewart Island. The rest of the island has been declared a protected reserve. There is a small predator-free island, called Ulva Island, that is only about 20 minutes by boat from Stewart Island. It has well-maintained walks throughout the island. It is a wonderful tranquil place to go to watch for birds. A very memorable part of the walk was when Wekas, a family group with a youngster (*Gallirallus australis*) walked right up to our group, looking for food.

In conclusion, I would like to thank the many wonderful people I met and worked within New Zealand. There was not one place where I wasn't made to feel at home. People opened their doors for a stranger who wanted to come and learn more about their most valued taonga (treasure). I also came to have a clearer understanding of how special these birds are to all the people of New Zealand. I also want to thank AAZK for helping me make this trip a reality through the Geraldine Meyers/AAZK Travel Grant. Finally, my thanks to my colleagues at SNZP who supported my long absence with a smile. Special thanks to Sue Mosenfelder who patiently helped with proofreading.

References

- Billing, Tony. January 1998. Kiwi Workshop Proceedings. Auckland Zoo. New Zealand.
- Department of Conservation. 1996-2006. Kiwi Recovery Plan. Wellington, New Zealand
- Department of Conservation. 2004. Captive Management Plan for Kiwi. Wellington, New Zealand.
- Grezelewski, Derek. 2000. Kiwi-icon in trouble. New Zealand Geographic. Number 45:66-97. Australian Consolidated Press, Auckland, New Zealand.
- Holmes, Tim. Hankey, Lisa. Oliver, Sophie. 1999. Captive Management Plan for North Island Brown Kiwi. New Zealand Conservation Management Group. New Zealand.
- Jacobs, Warren. 2002. The New Zealand Experience. New Holland Publishers. Auckland, New Zealand.
- Johnson, Tracy. 1996. Husbandry Manual for North Island Brown Kiwi.
- Kanze, Edward. 1992. Notes from New Zealand. Henry Holt and Company. New York.
- Orbell, Margaret. 2003. Birds of Aotearoa. Reed Publishing Ltd. Auckland, New Zealand.
- Peat, Neville. 1990. The Incredible Kiwi. A Wild South Book. Auckland New Zealand.
- Peat, Neville. 1999. Kiwi New Zealand's Remarkable Bird. Random House. New Zealand.
- Peat, Neville. 2000. Stewart Island. University of Otago Press. Dunedin. New Zealand.
- Wilson, Kerry-Jayne. 2004. Flight of the Huia. Canterbury University Press. Christchurch, New Zealand.
- Wolfe, Richard. 2000. The People's Bird. New Zealand Geographic. Number 45:12-20. Australian Consolidated Press, Auckland, New Zealand



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Full-time Warden - Six Flags Great Adventure Wild Animal Safari Park, Jackson, NJ

Interested candidates should submit a resumé to: Karol Kempke, Human Resource Manager, P.O. Box 120, Jackson, NJ 08527. Six Flags is seeking applications for a full-time Safari Park Warden. The Safari Park consists of 1200 animals including birds, reptiles and mammals. **Requirements:** Applicants must have strength, ability and alertness to work with various species of animals within a Safari Park. Applicants must have the ability to feed animals, clean houses, and general surroundings. Must be 18 years old, have valid driver's license, possess the ability to perform assigned duties in a safe & productive manner and be able to work in all types of weather conditions. Six Flags Great Adventure offers an excellent salary and benefits package. EOE.

Animal Attendant—Amarillo Zoo, Amarillo, TX

Applications are available by visiting the City of Amarillo website (www.ci.amarillo.tx.us/). They can be accepted via e-mail or sent to City of Amarillo Human Resources, Room 207, 509 E. 7th Ave., Amarillo, Texas 79105-1971. Resumes can be sent along with the application. For more information about this position contact Rhonda Votino, Zoo Curator, Amarillo Zoo, Amarillo, TX, (806) 381-7911 or e-mail: Rhonda.Votino@ci.amarillo.tx.us. Candidates must be enthusiastic, self-motivated, team-oriented and able to interact with other staff and the public. **Responsibilities:** This position will be responsible for the daily care of a diverse animal collection (mostly mammals, birds, reptiles and invertebrates) including husbandry, exhibit maintenance, behavioral enrichment, diet preparation/feeding, record-keeping, vet assistance and educational programs/tours. Some zoo grounds upkeep is also required including mowing, weeding, raking, watering, garbage pick-up, restroom maintenance, etc. **Requirements:** High school graduate and some experience working with exotic animals in a zoo-setting preferred. Must be able to lift heavy objects up to 100 lbs. and work outside year round. Requires considerable amount of walking, bending, squatting, etc. Must be available to work weekends, some holidays and overtime as needed. Must have a valid Texas driver's license.

Aviculturist - Dallas World Aquarium, Dallas, TX

Please mail resumé with cover letter and three (3) references to Cindy DiGesualdo, The Dallas World Aquarium, 1801 N. Griffin St., Dallas TX 75202 or e-mail to vetcindy@dwazoo.com. The Dallas World Aquarium is currently seeking qualified applicants for the position of aviculturist. The successful candidate will be involved in the care of a growing avian collection which currently includes over 100 species. Highlights of this collection include two species of *Rupicola*, three species of South American eagles, ten species of hummingbirds, and twenty-two species of toucans. **Responsibilities:** Duties will include daily observation within the avian collection, monitoring of health, daily and accurate record keeping, area maintenance and cleaning, and visitor interaction in both formal and informal presentation. **Requirements:** Applicants should be team-oriented (yet capable of working alone), highly motivated and possess good written and oral communication skills. Must be willing work weekends and holidays. Must be physically able to lift up to 50 pounds. A minimum of two (2) years experience working with avian species, preferably in a zoological setting, is required. Salary will be commensurate with experience.

Seasonal Animal Keeper & Handler (2006) - The Vermont Institute of Natural Science and Raptor Center, Woodstock, VT

To apply send cover letter (must include dates of availability, career goals and interests relative to the position), resumé, and list of three (3) references. Position is seasonal (6-12 months) starting in March 2006, full time. Salary \$8.75 per hour plus free housing. 1-3 positions will be available. **Application materials must be RECEIVED no later than 5pm EST, January 6, 2006.** Send to: Allison Stark, Rehabilitation Supervisor, 2723 Church Hill Road, Woodstock, VT 05091-9642; or email to astark@vinsweb.org or FAX: 802-457-1053. **Position Overview:** The Seasonal Animal Keeper & Handler performs the daily husbandry tasks for all permanent avian residents used in educational programs & exhibits. Position also includes work in the avian rehabilitation department assisting with the treatment and care of rehabilitation bird patients. Keeper will provide extensive informal educational programs and information to the public.

Responsibilities: Performs daily food preparation, feeding, watering, record keeping and enrichment duties; performs extensive cleaning and maintenance of indoor & outdoor animal facilities, enclosures and aviaries; performs maintenance tasks including shoveling snow, weeding, repairing and using hand tools; assists in training and overseeing volunteers and interns in animal husbandry routine; monitors the health status of each resident animal and assists with health checks; coordinates & oversees daily tasks during absence of Rehabilitation Supervisor and Bird Keeper/Trainer Supervisor; trained in the proper handling and management of all resident animals; provides extensive informal educational programs and information; and provides exams, emergency care and basic medical treatment & care to injured, sick and orphaned birds of all species. **Qualifications:** Strong interest in and experience working with birds; a high school diploma is required and a college education is strongly recommended; willingness to do extensive animal husbandry in outdoors setting; must be comfortable speaking and interacting with the public; must have experience with computers; experience in a zoological setting is a strong plus; a strong work ethic, good communication, observational and organizational skills are necessary; a valid driver's license is required; must be 18 years of age or older; physical capacity to carry out duties such as lifting equipment weighing up to 50 pounds, shoveling snow and climbing ladders; flexible and able to adjust to changing situations; and willing and able to work in all weather conditions (including extreme cold and snow) and evenings, weekends and emergency callouts and willing to live in a rural area with long winters and sunny, warm summers. **Work Environment:** The Vermont Institute of Natural Science and Raptor Center has locations in Woodstock and Quechee, VT. This private, non-profit organization, founded in 1972, provides environmental education, field research and bird rehabilitation admitting over 300 birds per year. The center has some reptiles and over 55 permanently injured raptors for education programs and exhibit. The center is located in the scenic countryside of east central Vermont two hours from Boston and 1+ hours from Burlington. Vermont is a great state for skiing, hiking and other outdoor recreation. Our web site is: <http://www.vinsweb.org/raptor-center/index.html>

Education Coordinator - Heritage Park Zoo, Prescott, AZ

To apply send cover letter and resumé to: Nick Derene, General Curator, Heritage Park Zoo, 1403 Heritage Park Rd., Prescott, AZ 86301. For More **Information:** nderene@HeritageParkZoo.org or (928) 778-4242 Ext. 13. **Description:** This position will be based at Heritage Park Zoo (HPZ), a wildlife sanctuary for non-releasable native and exotic rescued animals in Prescott, AZ. HPZ is developing its educational resources and programs into a fully-fledged education department. This position will take a leading role in the development of its program offerings, staff, educational animals, and other facets of the department. We are seeking a candidate with formal and informal teaching experience, as well as experience handling live animals in an educational setting. Experience with animal training, press coverage, video and still photography, and formal research desirable. Position is Non-Exempt Full-time 40/week. Reports to General Curator. Starting Salary: \$20,000 - \$25,000, commensurate with experience. **Start Date:** Negotiable. Applications will be accepted through November 2005. **Responsibilities:** Create curriculum for docent training classes and workshops. Manage training of docents. Supervise activities of docents. Book educational programs and services. Oversee scheduling of docents. Work with general curator to develop new educational programs. Work closely with animal curator and general curator to direct and participate in animal training. Work with marketing staff to produce marketing materials to advertise educational services. Conduct reviews and revisions of educational services. Work with general curator to add and manage educational signage and materials on-site. Work with animal curator and general curator in planning enclosure design for educational needs. Conduct on-and off-site educational programs. Assist in education employee selection/review process. Provide management to the education department. Direct continued-education programs for education employees. Enforce zoo rules and security measures. Perform other tasks as assigned by management. **Requirements: work experience** - Formal and informal paid experience performing wildlife/environmental education; Science-based field experience related to wildlife; Experience supervising staff and/or volunteers; and Experience training captive animals. **Education** - At least a four-year degree, with education related to the biological sciences; **Additional Requirements:** Excellent oral and written communication skills; Proven ability to work with little supervision. Must possess an Arizona Drivers License (within a month of hire) and have clean driving record.

Zookeeper II (Elephants) - Montgomery Zoo, Montgomery, AL

To apply you may visit www.montgomerypersonnel.com or call 334-241-2675. Applications will be accepted until needs are met. To obtain additional information about the Montgomery Zoo, please visit the website at www.montgomeryzoo.com. The pay range starts at \$23,328 and includes an excellent benefits package. The Montgomery Zoo has a NEW African Elephant Exhibit and is in need of a few good employees! Here is your chance to get in on the **GROUND FLOOR** and work in a **BRAND NEW, TECHNOLOGICALLY ADVANCED** African Elephant Exhibit. **Responsibilities:** Major work functions include acting as a lead in providing animal care to elephants housed in the Montgomery Zoo, observing elephant collections and exhibits, maintaining elephant exhibits, performing building and grounds maintenance, feeding elephants, and communicating with others. **Minimum Qualifications:** High school diploma or G.E.D. and two (2) years professional animal care experience within the last five years, or an

equivalent combination of education and experience. At least 1,000 hours or six (6) months professional experience working with elephants. Preference will be given to those applicants who have obtained their experience in a zoo or circus setting.

General Curator - The Lee Richardson Zoo, Garden City, KS

Submit application, resumé, and cover letter to Jim Berry, HR Director, PO Box 499, Garden City, Kansas 67846 or hr@garden-city.org. (No faxed applications or inquiries will be accepted.) **Closing date is February 1 2006**, or until position is filled, whichever comes first. Applications available to download at www.garden-city.org or by calling 620-276-1175. E.O.E. The Lee Richardson Zoo, an accredited AZA facility. Salary range is \$33,092 - \$45,115 with excellent benefits and retirement plan. **Responsibilities:** This position is responsible for living collection, including animal health and welfare, collection planning, selecting and supervising animal care personnel, communicating effectively with assigned staff and collaborative partners, assisting with exhibit design, general operations and other management issues. Reports and is responsible to Zoo Director. **Requirements:** A Bachelor's degree in Life Sciences and three to five (3-5) years husbandry and management experience in an AZA-accredited or similar institution preferred. The ideal candidate will have strong team leadership and management skills, a positive attitude, the capability to multitask, and excellent communication skills.

Animal Keepers(s) - Tiger Haven Sanctuary, Kingston, TN

To apply: Contact us at www.tigerhaven.org; Email us at indiab@tigerhaven.org; Fax: 864-376-0284; Phone: 865-376-4100 M-F. Tiger Haven Sanctuary seeks two (2) animal keepers. Live-in position available for right persons. **Responsibilities:** Working direct with big cats, cleaning, feeding, watering, enrichment and medical when needed. Environment: Hard work in all forms of weather conditions in a non-public facility. **Requirements:** At least 21 years of age, able to lift 50 pounds, dedicated respect of animals, able to follow company guidelines, long hours. Board available: Live-on position is available for the right person(s). This includes; housing, electric, water, sat. TV & basic phone service plus annual salary. Pay rate: \$10,400 annual salary for live-on position; \$14,560 annual salary for off site position Insurance: Accident & dental available at your expense.

Exotic Cat Internship - Center for Animal Research and Education, Bridgeport, TX

To apply for this position please send your resumé and references to Attn: Heidi Riggs, 245 County Road 3422, Bridgeport, TX 76426. C.A.R.E. is currently looking for qualified interns for 2005 and 2006. The Exotic Cat Internships run in 90-day sessions that allow for experience in the zoological field. C.A.R.E. provides housing for all accepted applicants. For more information please see website at www.bigcatcare.org **Responsibilities:** Assisting the Curator and Executive Director in planning and coordinating the care, diet, and maintenance of the habitats for exotic felines. Job duties include cleaning, food preparation, maintenance of enclosures and education work with the public. **Requirements:** Candidates must have good written/oral communication skills and the ability to work effectively in a team-oriented environment. Must have or working on a four-year degree in related field. All candidates must have the ability to lift 50 pounds and a willingness to work outdoors. Weekends and holidays are required.

Aviculture Interns Wanted - The Hawaii Endangered Bird Conservation Program at the Keauhou Bird Conservation Center (KBCC) on the Big Island of Hawaii and the Maui Bird Conservation Center (MBCC) on the island of Maui. For more information on internships at KBCC, please send a resumé, cover letter and the names and contacts of three (3) references to: Tracey Goltz P.O. Box 39 Volcano, HI 96785 or fax: 808-985-7034. For more information on internships at MBCC, please send this information to: Richard Switzer 2375 Olinda Road Makawao, HI 96768 or fax: 808-572- 3574. **Responsibilities:** Daily tasks include husbandry duties such as: diet preparation, aviary and facility maintenance, behavioral observations of breeding birds, grounds keeping, predator control. **Requirements:** Applicant must be able to live with several roommates in a remote area and should show enthusiasm for work with captive endangered Hawaiian birds. Applicant must have a valid driver's license and health insurance. Internships last for a 3-6 month period. Interns receive \$20/day stipend plus housing.

Big Cat Internships - Tiger Creek Wildlife Refuge, Tyler, TX

For more information or to download an Application Packet, see <http://www.tigercreek.org/internships.html>, no telephone calls please, all applicants must complete the Application Packet process for consideration of program participation. The Big Cat Internship as seen on Animal Planet involves Animal Care Apprenticeship and Public Educational presentations involving Big Cats. This is a 90-day position (by 4 quarters/terms) allowing one to gain experience in the zoological field. **Responsibilities:** Job duties include cleaning, diet preparation, light maintenance, educational tours, etc. Interns are responsible for the daily cleaning and health monitoring of a large number of exotic feline species including but not limited to tigers, lions, leopards and pumas. Big Cat Internship opportunities also include working in environmental education with schools and youth groups in a variety of learning activities. Interns will present short

guided lessons on animal care techniques, conservation and rescue methods, backgrounds on the big cats and much more. This wide variety of teaching opportunities and educational training provides the intern with an exciting array of new skills and experiences. Training is provided by the staff. **Requirements:** At least two (2) years of undergraduate college work in wildlife management, education, biology, or related field. If no college experience then two (2) years of verifiable work experience in unrelated field or one (1) year of work experience in animal care field. All applicants must be at least 20 years of age by start date. These positions require motivated persons with a career focus in biology/zoology/wildlife management. Housing is provided for these non-paying positions. Interns provide a strong commitment to the refuge, with a six- day workweek and light duties on Sundays.

Internship - (Tigers For Tomorrow Exotic Animal Preserve) Fort Pierce, FL .

To apply send cover letter and resumé to: Susan Steffens/ Executive Director- Tigers For Tomorrow, 18905 Orange Ave, Ft. Pierce, Fl or email to Sue@tigersfortomorrow.org. This non-profit organization is seeking two (2) possibly three (3) student interns for the 2005 fall season. Tigers For Tomorrow is a last stop exotic animal rescue preserve that houses and specialize in big cats. The preserve is in the beginning stages of moving to a new facility, interns will assist management in the move and care of the animals.

Responsibilities: The intern will assist in the daily husbandry of preserve residents, assist in interpretive talks, work with the public. **Requirements:** Desirable qualifications include the ability to communicate effectively with people, writing skills, orientation to details, and be a self- motivator. Benefits include room and board, and \$50.00 a week. Personnel transportation is required.

More Zoo vacancies can be seen by visiting:

American Zoo and Aquarium Association - Job Listings
<http://www.aza.org/JobListings/>

American Association of Zoo Keepers - Opportunity Knocks
http://www.aazk.org/aazknew/animalKeepersForum/opportunity_knocks.asp

European Association of Zoos and Aquaria - Vacancies
<http://www.eaza.net>

Australasian Society of Zoo Keeping (ASZK)
<http://www.aszk.org.au/Zoo%20Positions%20Vacant.htm>

Berufsverband der Zootierpfleger e.V
<http://www.zootierpflege.de/stellen/stellenzooseiten/STzoowebsites.html>

Zoo Vets, Technicians and interns
http://www.aazv.org/job_openings.htm

Bird Jobs in the Field
<http://www.birdingonthe.net/maillinglists/BJOB.html>

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Canadian Members

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\$40.00 Professional

Full-time Keepers

☐

\$40.00 Affiliate

Other staff & volunteers

☐

\$40.00 Associate

*Those not connected with
an animal facility*

☐

**\$65.00 or up - Individuals
Contributing/Canada**

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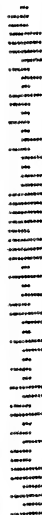
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